

October 1945

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Settling Tanks
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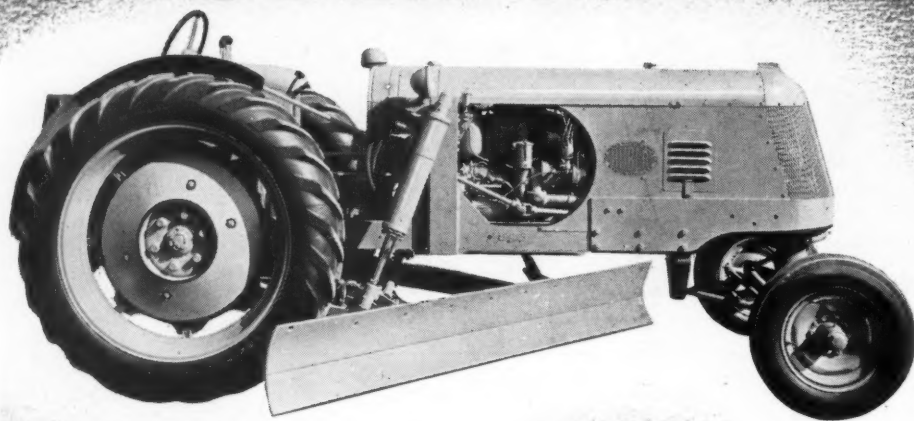


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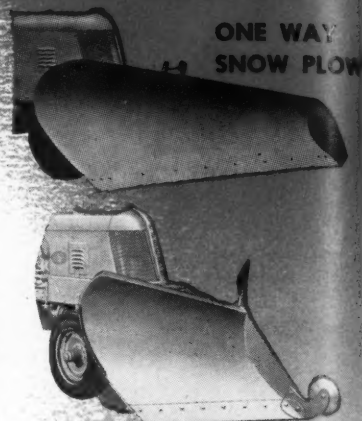
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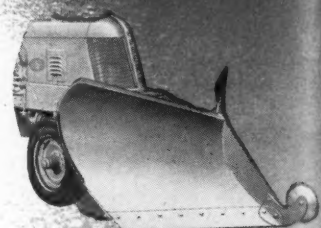
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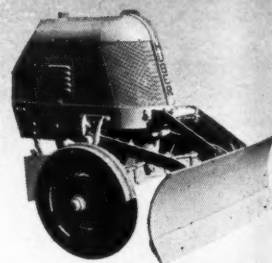
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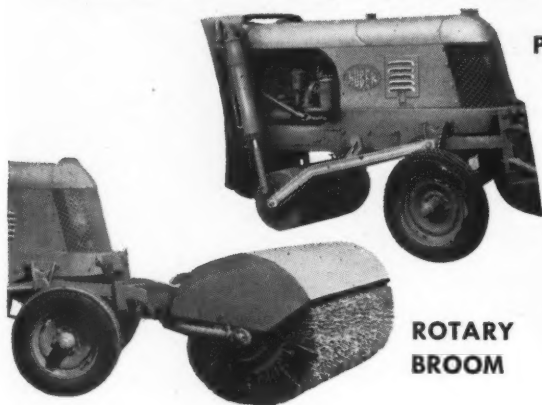
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SNOW PLOW



V TYPE
SNOW PLOW

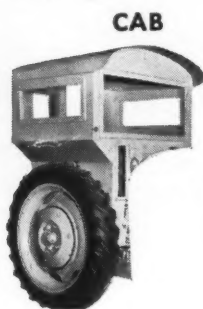


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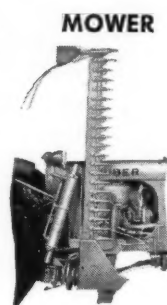


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Vol. 76 No. 10

A. PRESCOTT FOLWELL, Editor

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35 cents each except issues containing book-length texts, which are \$1.00 apiece.

POSTWAR PROJECTS

Federal Moves for Reconversion

The general WPB control exercised through L-41 will end on October 15th, when that order is to be revoked. Limitations on construction of electric, gas, and water facilities were removed Sept. 30.

There remain a few priority controls of the WPB. These comprise three priority ratings: an AAA rating for materials for projects of national importance; MM for materials for military projects; and a CC rating to be used if necessary for breaking severe bottlenecks encountered in civilian construction.

Price control by OPA continues to regulate the manufacturing and retail price of practically all construction materials. These, however, are subject to adjustment to aid in adequate production, such as an increase last month of \$2.00 per M for common brick manufactured east of the Rocky Mountains and \$3 per net ton for cast-iron soil pipe.

Among other federal relinquishments of control are the revoking of the tire allotment plan; the termination Dec. 1 of rationing of new commercial vehicles, including trucks, tractors and trailers; the removal of price control on automotive parts used to equip new trucks and commercial vehicles; the removal Oct. 1 of all restrictions on group travel, including that to conventions. Highway construction has been freed from all government control. Any purchaser can now place orders for motor trucks with dealers.

To the extent that federal appropriations of \$1,106,000,000 for 1945 and 1946 are matched by the states, there will be available for highway construction up to the end of next year \$2,212,000,000. Unfortunately plans are not ready for this amount of work. "However," said the American Road Builders' Association, "with the discharge of large numbers of the armed forces it is believed that plans will be stepped up at a much greater rate than has been possible in the immediate past." Of the sum above referred to, \$106,000 is the unexpended balance of previous federal aid funds, frozen during the war, restrictions on the use of which were removed Sept. 13.

The Public Roads Administration's latest announced estimate of plans of state highway departments is that they have projects ready for contract amounting to \$616,000,000 and plans under way for \$2,500,000,000; that counties have \$250,000,000 of work ready for contract and municipalities \$150,000,000.

Shortages of Materials

Last month we reported WPB as saying that "by Sept. 30 sufficient lumber should be available to meet all construction requirements." A widespread strike of lumbermen, however, has changed the picture and lumber will continue scarce until some time after the strike has been settled.

Steel also is becoming increasingly scarce because of the coal strike. Also shortages are reported in cast-iron soil pipe, brick and clay sewer pipe.

FWA's Planning Survey

The Federal Works Agency will soon begin a new survey on the volume and status of state and local public works planning which is in the completed stage

and that in the design stage. This information is to be kept up to date. Up to Sept. 15, applications for federal aid for planning had totaled \$18,000,000, for projects estimated to cost about \$600,000,000. The appropriation for this purpose is only \$17,500,000, and FWA considers that an additional appropriation of \$100,000,000 is desirable.

An Electronics Prophecy

In PUBLIC WORKS for January, 1944, we published a discussion of the Electron Tube—the various types and the uses to which they can be put. In a recent paper before the New England Water Works Association, D. M. Nielsen gave up-to-date information on how electronics are being used in the water works field, and made some prophecies as to future developments.

The latter are especially interesting. After referring to their use in the measurement and control of pH, turbidimeters, titrometers and pipe finders, he said: "It is probable that there will also be an increasing use of electronic techniques in telemetering equipment for the transmission of measurements of flow, level, and other variables over long distances. . . . It is my belief that somebody is going to put on the market in the next few years a main line meter" using the electronic generation and transmission of pulses and their conversion to flow velocity from apparent frequency shift.

"I am personally highly optimistic about the use of electronic equipment directly in accelerating or modifying separation processes and chemical reactions. . . . The use of high frequency (or so-called supersonic) sound waves is promising for separation processes, such as sedimentation or flocculation. The equipment used is a vacuum tube oscillator, which generates AC power at the desired frequency (commonly around 50,000 cycles per second). This power is fed to a converter unit . . . immersed in a liquid" which "sets up compression waves in the liquid. . . . In suspensions containing particles with specific gravities only slightly more than that of the liquid in which they are suspended and with a size above a certain minimum, flocs are formed as soon as the supersonic vibrations begin. . . . To me there is in this supersonic equipment the possibility of a radical change in filter plant methods and practice. It could mean either the total elimination, or else a great decrease in the size, of sand filter beds used, and the employment of small electronic flocculation units through which the raw water would flow at relatively high velocities. . . . These waves also have a powerful disintegrating effect on microorganisms in the liquid," causing disinfection of it.

It would seem that the same process would be equally effective in clarifying sewage. Which calls to mind the prophecy of a generation ago that electric shocks would be used to clarify sewage and kill the bacteria. But the centuries-old processes of screening and sedimentation are still our main stand-bys for clarification; aided, it is true, by coagulants. Possibly electronics may take the place of chemicals for coagulation, but we doubt whether the change would be economical. However, with the miracle of the atomic bomb so recent, we do not dare to be too skeptical of any scientist's enthusiastic dreams.

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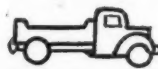
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STREATOR, ILLINOIS

Designing Sewage Settling Tanks

How to fix the capacity and dimensions of a primary tank, and of secondary tanks for filter and activated sludge effluents. Details of structures for distributing flow among several tanks.

By M. B. TARK

Associated Engineer of Design, Dept. of Public Works, Philadelphia, Pa.

THE first settling tanks of which we know were constructed three thousand years ago for the clarification of the waters of the Tigris, and ever since then sedimentation has been considered the most efficient and economical method for removing suspended solids from fluids. It was not until the end of the last century and the beginning of the present one that any mechanical device for removing sludge from settling tanks was installed in sewage treatment plants. Plain sedimentation with anywhere from 8 to 24 hours retention period was the usual process in England. Manually cleaning these large tanks was laborious and disagreeable work, and machinery for removing the sludge was developed, first in Germany and a little later in England. Scraper conveyors and the suction type of machine were used in Germany for rectangular and round tanks in the ninety's, and scrapers for round tanks were installed in Birmingham in 1900, and there

the late Mr. O'Shaugnessy built the first large separate digestion tank, although separate digestion had been practiced several years before on an experimental scale at the Lawrence Experiment Station. The combination of mechanically operated cleaning devices and separate digestion has brought about the present popularity and almost universal use of settling tanks in sewage treatment plants.

In designing a settling tank the first point to be considered is efficiency in the removal of suspended solids; second is convenience of operation; and third, cost of installation and operation.

Theoretically, the period of detention depends on the specific gravity of the suspended solids and viscosity of the liquid; but a number of other factors come into play which must be considered. These include distribution of the sewage between a number of tanks and across the section of each individual tank, the momen-

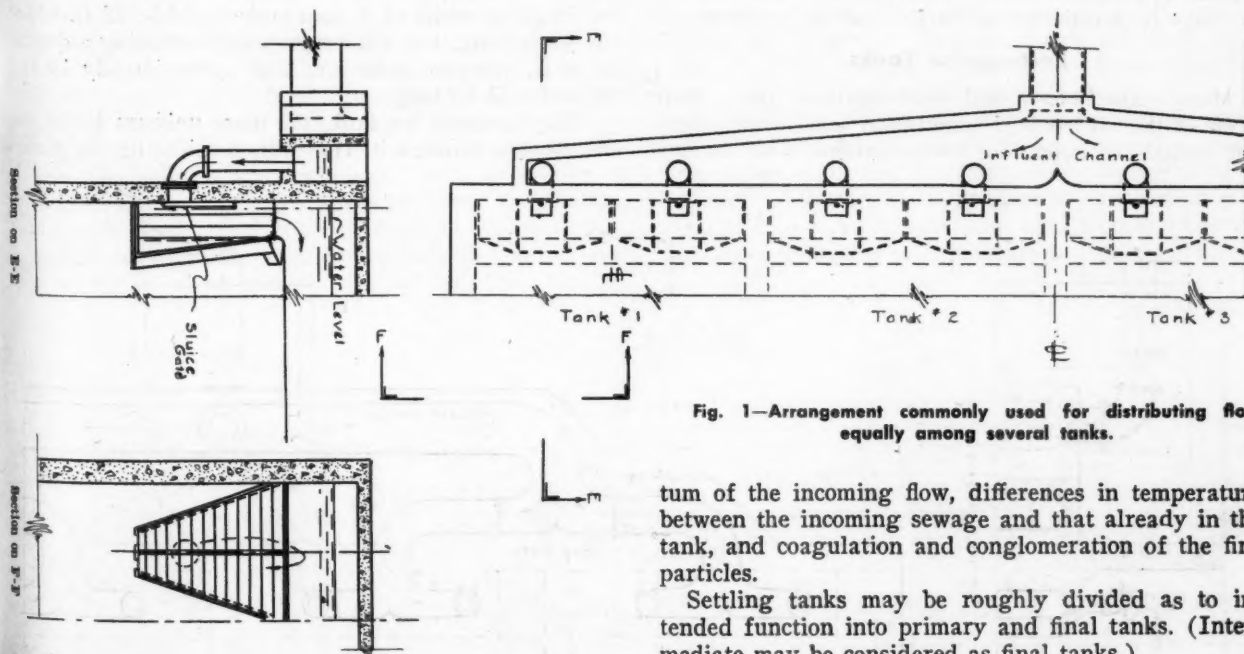


Fig. 1—Arrangement commonly used for distributing flow equally among several tanks.

tum of the incoming flow, differences in temperature between the incoming sewage and that already in the tank, and coagulation and conglomeration of the fine particles.

Settling tanks may be roughly divided as to intended function into primary and final tanks. (Intermediate may be considered as final tanks.)

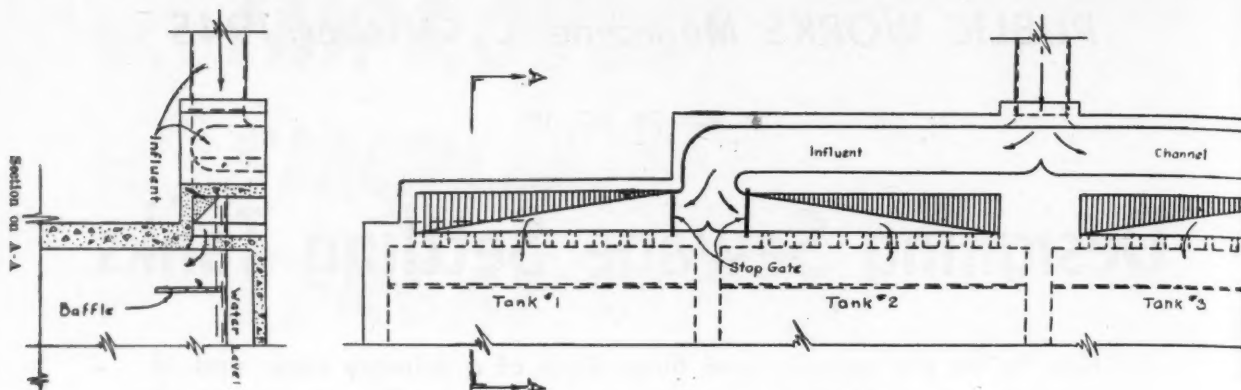


Fig. 2—Distributing arrangement giving better results than Fig. 1.

Classified as to shape, they may be either rectangular or round. As a rule, when used as primary tanks rectangular tanks cost less and are more efficient than round ones if the diameter of the latter is less than 60 ft. A round tank of more than 60 ft. diameter will generally cost less than a rectangular one of the same capacity and have about the same efficiency.

Where primary tanks provide the only treatment, experience has shown that a detention period of 2 or 3 hours is desirable, although some states require a 4-hour period. Where settling is followed by standard filters, a 2-hour period is generally required; and 1 hour to 1½ hours preceding activated sludge treatment. For modified aeration, a 1½-hour detention period is commonly provided, although this may be subject to revision after more plants of this type have gone into operation, especially if the excess sludge is returned to the primary tanks.

These detention times are those which have appeared to give the best results in the operation of tanks of standard design when treating sewage of average character. For tanks incorporating unusual features or treating sewage possessing unusual characteristics, or aiming at a higher degree of clarification, shorter periods may be permissible or longer ones be necessary.

Rectangular Tanks

Many experiments and investigations have been made of the efficiency of rectangular tanks with different periods of detention. Investigations made in two

plants showed a two-hour detention period giving practically the same results as a four-hour one. Comparing the actual with the theoretical detention period, a 2-hour detention period figured 51% and a 1-hour period 75% efficiency; that is, the actual detention period in the former was 1.02 hr. and in the latter 0.75 hr. The removal of suspended solids in the same tank was 60% for a 2-hr. detention period and 50% for a 1-hr. period. The tanks on which these investigations were made are 60 ft. long; different results would probably be obtained on longer ones.

The size of the tank is determined by the detention period adopted. The length of a tank should be from 3 to 4 times the width. The length may be from 30 ft. for small installations to 270 ft. for large ones. The depth as a rule is not less than 8 ft., although very small tanks have been built as shallow as 6 ft. For lengths up to 100 ft. the depth should not exceed 10 ft.; longer tanks may have a depth up to 12 ft.

For example (using approximate figures): For a 1 mgd plant with 2 hours' detention period, a total tank capacity of 11,100 cu. ft. is required. Such a plant should have at least two units, each with a capacity of 5,550 cu. ft. Assuming a depth of 10 ft. and a ratio of length to width of 4, each tank would be 12 ft. wide by 48 ft. long. For a 0.5 mgd plant, assuming a depth of 8 ft., the two tanks would be approximately 10 ft. wide by 35 ft. long.

The narrower the tank, the more uniform is apt to be the flow through it. However, considering the plant

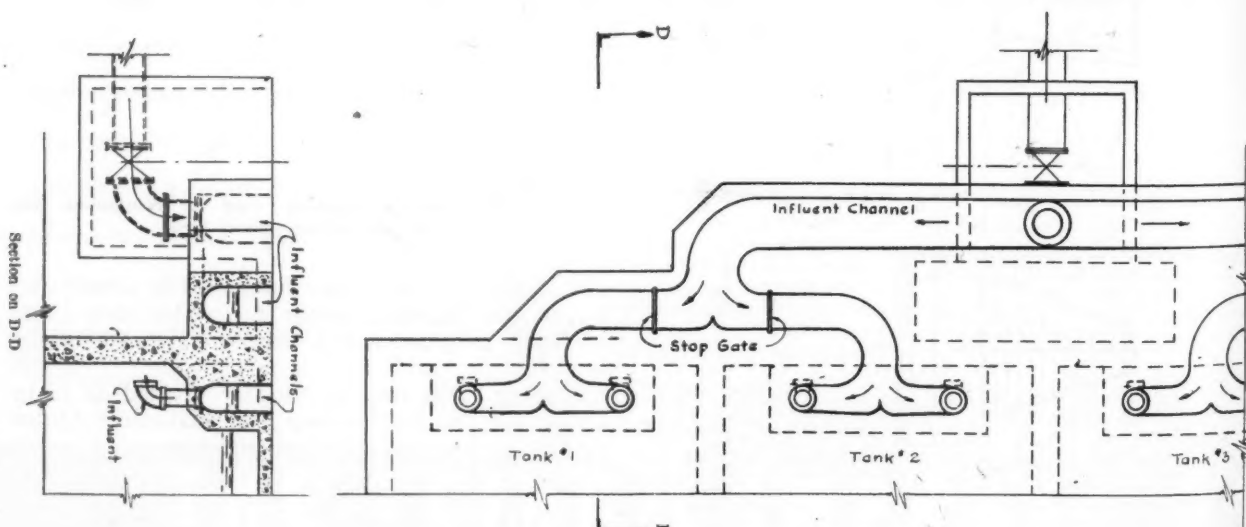


Fig. 3—Give better results than Fig. 2 but necessitates more loss of head.

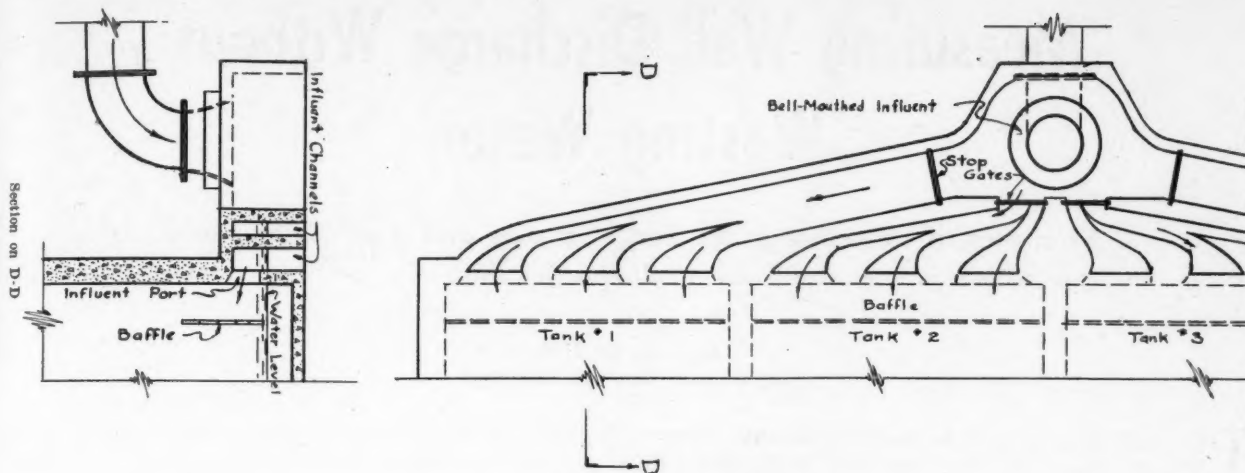


Fig. 4—Mieder's design for distributing flow.

as a whole, it should present a compact and, if possible, a symmetrical appearance; and while the tanks in the 1 mgd installation might be made 8 ft. deep, 10 ft. wide and 70 ft. long, it would be rather difficult to fit these proportions into the general layout.

The equal distribution of flow between a number of tanks is a rather difficult problem, but an important one. Fig. 1 shows the arrangement most commonly used, the flow to each unit being controlled by gates and the distribution varying as the flow varies.

Fig. 2 is an improvement on Fig. 1, fair distribution being obtainable with this design. Fig. 3 gives better results than Fig. 2, but has the disadvantage of loss of head, as the effluent weir should be set at the same elevation as the invert of the influent channels.

Fig. 4 shows the design developed by Mieder at Leipzig, as the result of ten years' work by the trial and error method. This gives excellent results.

The usual method of distributing the flow across the width and depth of the tank is a baffle at the influent end. It should be located about 10 ft. from the end of the tank but the use of mechanical equipment necessitates placing it much closer. The upper edge should be a few inches below the water level to prevent the accumulation of grease behind it. In most cases the baffle is composed of 6 or 8 planks lowered with their ends in vertical slots, thus making it possible for the operator to adjust it after trying it out in actual operation. Discharging against the end wall, as in Fig. 3, without the use of baffles, gives excellent distribution.

So also does the construction shown in Fig. 5. In this, settlement will take place in the influent channel and a loose plate must be put in the bottom of the channel

through which the sediment can be removed by occasional manual cleaning. Also scum will accumulate between the weir and the end wall and must be removed by spraying with a hose or a permanent installation of spray nozzles.

In rectangular tanks 200 ft. long or more, the flow through the tanks is more or less self adjusting and provision of special arrangement for distribution is less essential than in shorter tanks.

An aerated influent channel with weirs for each tank provides excellent distribution between a number of tanks and also for each individual tank. This should be preceded by a good grit chamber. The depth of such channel should not exceed 6 or 7 ft., as greater depth permits heavy suspended solids to settle.

Sludge Removal

Flight conveyors of either the single or multiple-blade type are the standard equipment for sludge removal.

In the single-blade machine, either traction or rope drives are employed. The blade is usually made of steel. For a tank 60 ft. long it should be at least 12" deep; the longer the tank the deeper the blade, up to 30" for a tank length of 250 ft. Such machines have been built for tank widths up to 75 ft.

In multiple-blade conveyors the flights are spaced at 10 ft. intervals. Redwood is the material preferred for flights as it does not warp, either wet or dry. The width of collectors does not generally exceed 16 or 18 ft.; 20-ft. ones have been built, but shafts and bearings become very heavy for such a long span.

(Continued on page 46)

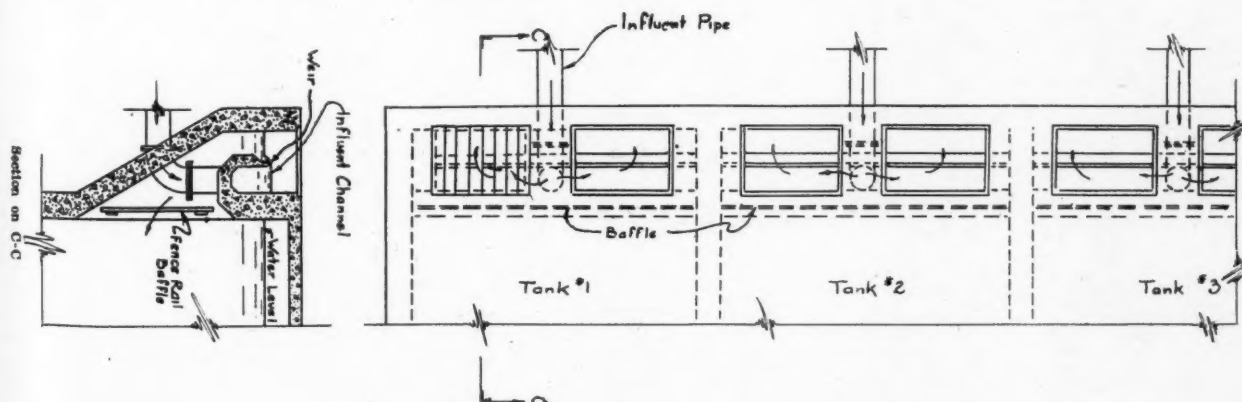


Fig. 5—Construction for distributing flow across width and depth of tank.

Measuring Well Discharge Without Wasting Water

By means of an orifice in the end of a pipe and a piezometer tube, the water is measured as it discharges into the settling basins.

By T. H. SAUTER

City Engineer, Cuyahoga Falls, Ohio

THE City of Cuyahoga Falls, Ohio, obtains its water for municipal use from deep wells that are adjacent to the water treatment plant and are located within the corporation limits. The area in which the wells are located has been developed for park purposes during recent years and, for that reason, the testing of new wells has become a source of aggravation inasmuch as it is necessary to construct discharge waste lines from the wells being tested to the Cuyahoga river, a distance of approximately 500 feet or, as an alternate, to discharge the waste water directly into the park area where, because of poor drainage conditions, the water remains for a considerable length of time. Because of this inconvenience, the testing of wells has been neglected in the past.

The most recently developed well was of 1500 g.p.m. capacity, and on a 12-hour test produced a considerable amount of waste water which flooded a large portion of the park area. Since this procedure was repeated each time a well was tested, the writer decided to do some serious thinking and the result was the metering device as described below.

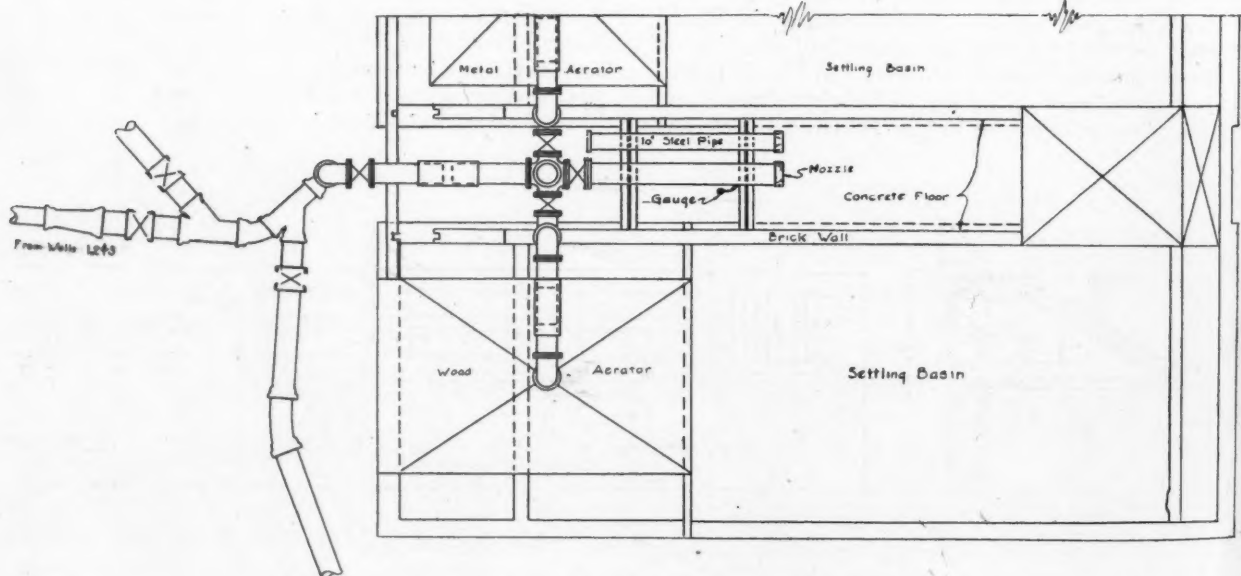
In measuring the capacity of the wells in our system, the important consideration was the amount of water each well was producing, not at the well site but at the aerators and settling basins; and, because all the well lines tie into a common line to the aerators, what effect the production from the various wells had on each other when operating as single units or in combination with each other. The accompanying prints and photographs show the arrangement of the meter in combination with the supply lines to the aerators.

This method of measurement is based on the theory of measuring water by a circular orifice at the end of a discharge pipe and is obtained by recording the head of water in inches in a glass tube connected by flexible tubing to the discharge line. In order to meet the requirements of the various wells, when producing singly or in combination, it was necessary to have two discharge pipes of 10 and 12 inch inside diameter, respectively, and orifices of $6\frac{1}{2}$ and $8\frac{1}{2}$ inches diameter. With this arrangement it was possible to record capacities up to approximately 4,000 gallons per minute.

A 10-ft. length of steel pipe, flanged at one end, is bolted to a valve, which is connected by an elbow to the pipe which supplies water to the aerators. The other end of the steel pipe is threaded and on it is screwed a cap with a standard circular orifice in the end; this orifice being $6\frac{1}{2}$ " in diameter for the 10" pipe and $8\frac{1}{2}$ " for the 12" pipe. These discharge into the settling basins.

The cost of installing this type of metering is negligible as compared to the cost of installing temporary waste lines from the individual wells and, although this may not apply to systems other than our own, it certainly would bear investigation by cities where conditions are comparable to those in Cuyahoga Falls.

It can readily be seen that, as a result of metering by this means, periodic tests can be made either on a daily, weekly or monthly basis at the discretion of the engineer or operator in charge. The tests are made on a monthly basis and the information compiled is



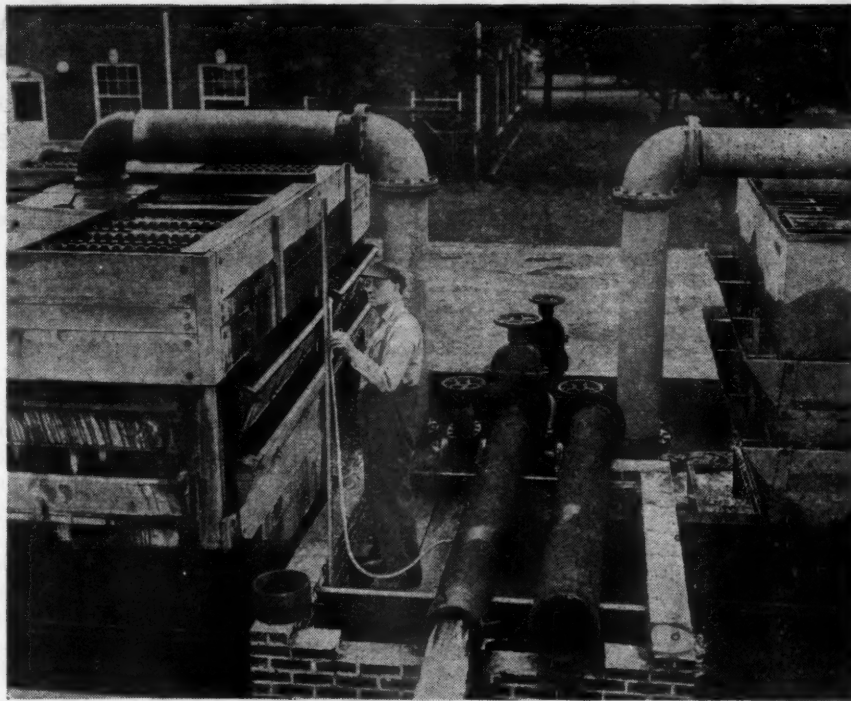
Arrangement of piping at aerators for measuring the flow.

then given to the State Board of Health and the Ohio Water Supply Board, where it is filed in connection with other reports received by them to be used in determining the water table for the district in which Cuyahoga Falls is located.

The attached table shows the record as furnished to the State agencies and giving the following information: Rated capacity of the well; Pumps; Size of metering pipe and orifice; Gauge measurement in inches; Capacity g.p.m. taken from curve, and draw-down in feet. Because of the ease of conducting these tests a check can be kept on the production of each well and also on the ground-water supply.

The measuring of the production of our wells in the past has never been satisfactory and by this method we are able to keep an up-to-date and accurate record. As a result of this method of measuring the flow from the various wells, we were able to secure the best sequence of operation for the wells and now feel justified in the expenditure that was made for the installation.

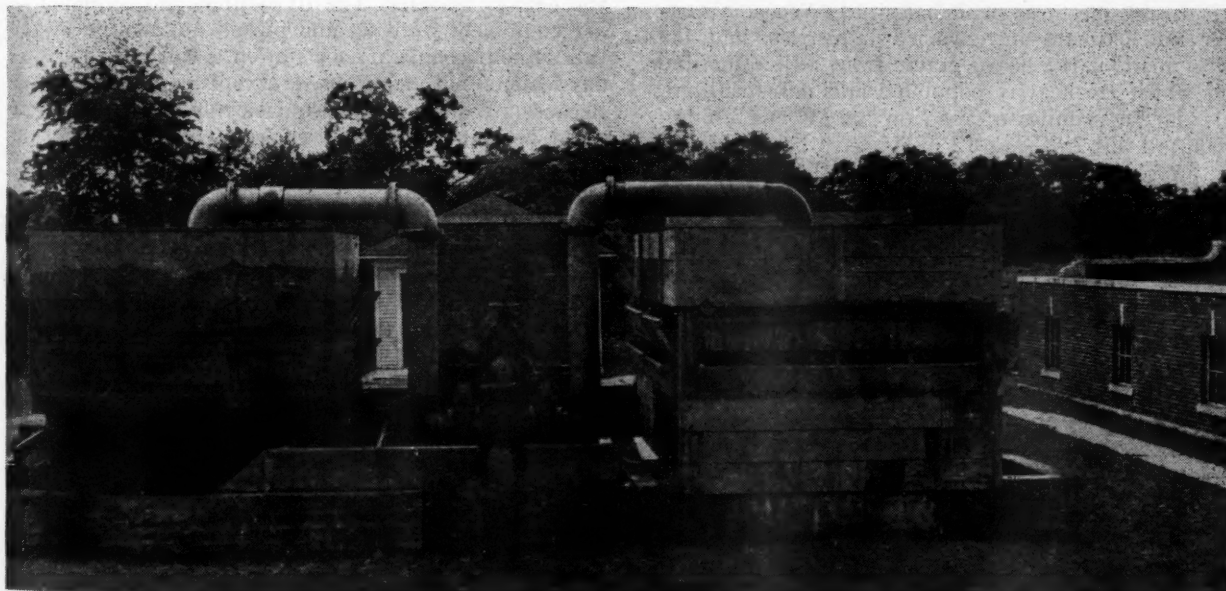
For those communities where the source of supply is limited, this method of testing would save a con-



Operator measuring flow from a well. The angle-iron gauge is graduated in quarters of an inch. The operator has just closed the valves controlling the supply to the aerators, but water is still passing through the troughs.

siderable amount of water, inasmuch as all the water used in the tests is wasted directly into the settling basins, resulting in no loss whatsoever in water production.

	WELL #1			WELL #2			WELL #3			WELL #4		
	10" Pipe—6½" Orifice			10" Pipe—8½" Orifice			10" Pipe—6½" Orifice			10" Pipe—6½" Orifice		
	Head	Cap	Draw	Head	Cap	Draw	Head	Cap	Draw	Head	Cap	Draw
	Inches	G.P.M.	Feet	Inches	G.P.M.	Feet	Inches	G.P.M.	Feet	Inches	G.P.M.	Feet
1945												
JAN.	24½	810	35	16¾	1420	40	16	660	—	5½	390	45
FEB.	24¾	825	35	17	1490	42	17½	690	—	6	400	—
MAR.	24¾	825	35	17	1490	30	17½	690	—	6	400	—
APR.	24¾	825	30	17	1490	20	17½	690	—	5½	390	—
MAY	25	830	30	17½	1495	20	17½	690	—	6	400	—
JUNE	25	830	32	17½	1495	24	17½	690	—			
JULY	25	820	33	16	1400	20	16	660	—	5½	365	—



Shows connections for the meter inserted between the riser pipes to the aerators. The common supply line to the aerators is shown in the foreground.

Traffic Survey in Wayne County, Ohio

Officials of Wayne County, Ohio, needed traffic data but were without the equipment and manpower to get it. How the equipment was secured and how it was operated with limited help will be of interest to others facing the same problem.

By W. H. METZLER
County Engineer, Wayne County, Ohio

THE need for traffic study in Wayne County developed chiefly from three factors: the present sources of county road revenues; the type of county and the present state of its road system, and the Federal Aid Highway Bill of 1944.

For the maintenance and repair, construction and reconstruction of roads and bridges on the county system of highways, most Ohio counties derive all their revenue from the road users. That is, the county receives a percentage of the automobile license fees and of the gasoline tax collected from motor vehicle operators in its area. It seems, therefore, reasonable and fair that the apportioning of expenditures for the major improvements on this road system, even though it is local, should be based on the actual and potential traffic on these roads and the requirements of this traffic.

Wayne is a medium-sized rural county, but is located not far from important metropolitan and industrial areas. Cleveland is 55 miles north of Wooster, seat of Wayne County; Akron is 30 miles northeast; Canton is 30 miles east; Mansfield is 35 miles west; Columbus, the state capital, is 95 miles southwest. Wooster itself is the center of a rich agricultural region, and just south of it is the Ohio Agricultural Experiment Station, a nationally important research center. Wayne County is known as the third richest agricultural county in the United States. Gross farm sales during 1944 were over 10 million dollars. All of these farm products, during some portion of their trip to markets, move over local roads serving the farm areas. While the county is basically rural and agricultural, the three principal cities—Wooster, Orrville and Rittman—have varied industries, and the county roads carry heavy traffic from adjoining districts which are heavily populated and industrialized.

Of the 501.4 miles of road on the Wayne County system, all but 2.5%, or 12 miles, have been widened and surfaced with gravel, stone or slag to give a traffic-bound surface, or with bituminous material, brick or concrete. However, only 80 miles have been hard surfaced. Most of the 12 miles of unwidened road is lightly surfaced with gravel, cinders, slag or stone. It is evident that the requirement here is the improve-

ment of certain selected sections with a dustless, higher-type hard surface capable of withstanding the traffic wear of heavier volume.

For some time prior to 1944 it had been evident that Congress would give serious consideration to setting up a Federal Aid Program for post-war highways, both state and local. The Federal Aid Highway Bill of 1944 has made possible help for all localities having a planned program and matching funds. The selection of a Federal Aid system of county and township secondary local highways is in progress in Ohio and in most other states. Now, then, is the time for counties to utilize any traffic data they have in the choice of local roads for the Federal Aid system—roads most suitable to serve the greatest traffic need.

Recognizing the coming need for traffic information, Wayne County in 1943 presented the problem to the Ohio Planning Survey, Columbus, Ohio, through the State Highway Department. The Ohio Planning Survey understood the county's problem, and offered impact counters and auxiliary equipment for use in 1944. In April of that year, after traffic-bound roads were solid and the rainy season past, ten portable impact traffic counters and auxiliaries were obtained from the Planning Survey, which instructed the county staff in their operation. It was stated at that time that Wayne was one of the first Ohio counties to attempt such a survey with the equipment.

The survey was made during the summer of 1944, the work being arranged to get the maximum use of the equipment. About 200 miles of road were selected, roads known to be of importance, hard to maintain and heavily traveled. The 10 counters and accompanying equipment were set and picked up, enough to get full 24-hour counts at each station, Saturday and Sunday counts not being used except in special cases. Because of other work requirements, no one person could be kept on the survey, so that at one time or another each member of the engineering staff set and picked up the counters.

Traffic counts were taken at 300 stations, covering fairly well the 200 miles of road to be checked. Careful records of the actual counts were made and checked and rechecked where necessary. Duplicate information was sent to the Ohio Planning Survey to be used in their state-wide study. Maps were made showing the actual count and location of each station. When multiplied by the proper factors, these counts will serve to make the traffic-flow map, now in preparation, portraying the aver-

(Continued on page 26)



Setting an impact counter on a Wayne County road.



W. H. Metzler

Operation of Screens, Grit Chambers and Sedimentation Basins

Methodical cleaning of racks and screens important. Handling of screenings. Control of grit deposits and securing clean grit. Handling sludge and scum from sedimentation basins.

By R. C. MERZ

Sanitary Engineer, Chain Belt Company

PART 1 — SCREENS

THE primary purpose of bar screens is to protect the equipment which follows the screen in the treatment process, and for that reason it should always precede all other equipment, including the grit chamber. It is necessary to protect pumps from injury; grit collector equipment from being fouled with rags; and gates, siphons, trickling filter nozzles, and other plant items from clogging. The removal of screenings will reduce the volume of unsightly scum and prevent the formation of heavy scum layers in the digestion tanks. In cases where pre-chlorination is practiced, it is essential that the large solid matters be removed by a screen, since such materials are not readily penetrated by chlorine. In some instances it may be that a screen is the only treatment unit required. Where considerable dilution is available and it is possible to discharge the raw sewage directly into the receiving stream, screening should still be resorted to in order that the large solids will be removed and formation of unsightly scum blankets lessened.

A screen is sometimes used as a substitute for sedimentation. In such cases, a fine screen is used, or one having openings of generally $\frac{1}{4}$ " or less. Although their use is not common at present, fine screens are being used more and more in place of primary tanks in certain high rate filter processes.

A screen should be so designed that it will have ample capacity to pass the maximum flow, with the velocity *through the bars* not exceeding 2 feet per second. If handling a combined flow, where the peak storm flow greatly exceeds the peak domestic flow, it is safe to design on the basis of a 3-foot per second velocity for the storm flow. As soon as velocities rise above these figures, several things happen almost simultaneously which can only result in trouble. Materials which may clog the pumps or cause some other damage will be forced through the bars; the screen

will begin to plug rapidly; and the head loss will immediately begin to rise with equal rapidity. High head loss may put an undue strain on the equipment and will be directly responsible for an unwelcome plant surge as soon as the rack is cleaned.

The velocity in any screen chamber should be checked. If found to be too high, it can be controlled through the use of a weir or baffle, whichever may be necessary. The minimum velocity obtaining ahead of a bar rack is also important. The screen channel should be of such size that the velocity in the channel does not at any time drop below 1 foot per second and so cause deposition of grit or of organic solids. If the velocity is found to be too low, it is a comparatively easy task to narrow the channel.

If a plant is served by a hand-cleaned bar rack, and flows have increased to the point where an unreasonable amount of attention must be given the rack to keep it clean, the situation can be relieved by installing a mechanically cleaned bar screen, which will give greater capacity. This piece of equipment is readily adaptable to an existing channel with practically no changes being made in the existing structure.

The approach to the bar rack is worthy of careful consideration. Too often the sewage is brought into the screen chamber from one side, after which it is supposed to change course by 90° before flowing through the rack. The result is a piling up of the debris on one side of the bar rack, resulting in an unbalanced load on the rack itself as well as on the cleaning rake. The disadvantage is purely a mechanical one, but nevertheless of the type that gives the operator the most trouble. The condition can be corrected through the design of a suitable baffle arrangement which will assist in directing the flow along a desired course and cause it to reach the rack with reasonable distribution of the load it is carrying.

The bar spacing in a rack is of prime importance.

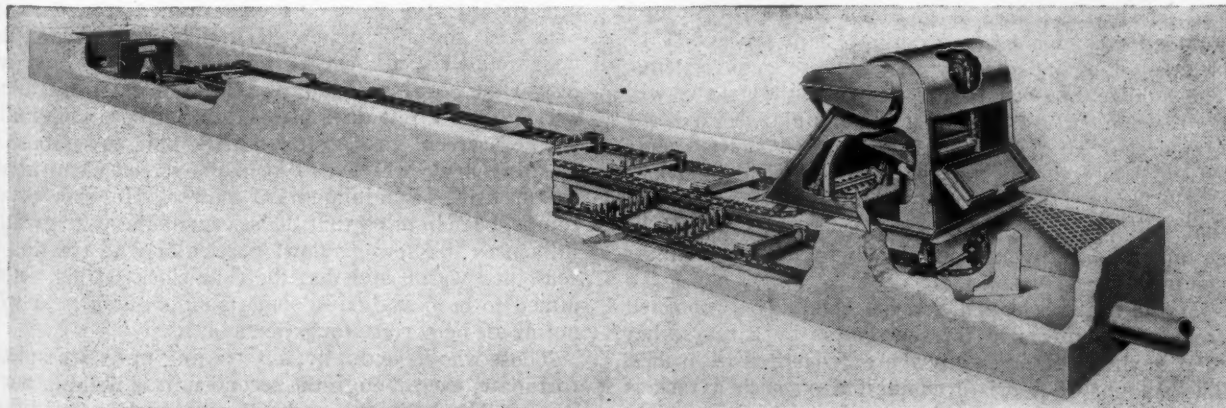


Fig. 1—Rex grit collector for capacities of 1,400 to 17,500 gpm. V-shaped buckets carry grit along tank and elevate it and discharge into cans.

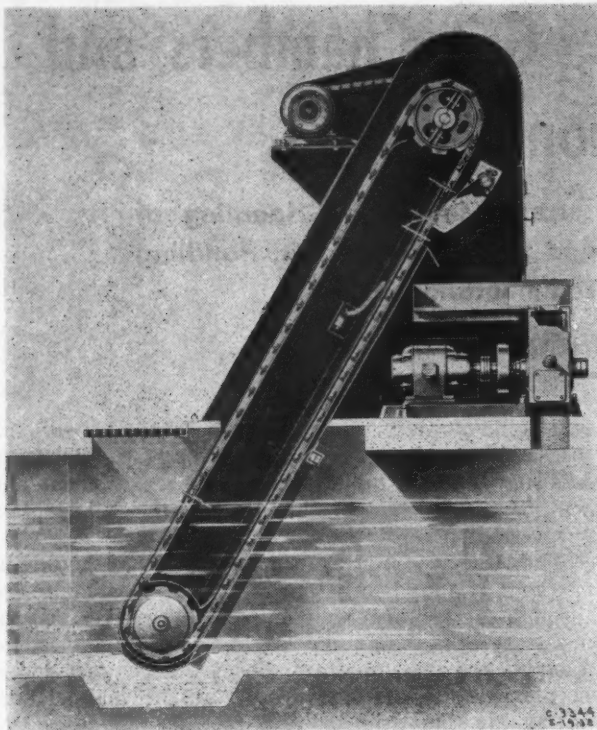


Fig. 2—Rex combination mechanically cleaned bar screen and triturator.

Many an operator who has a mechanically cleaned bar screen, or a hand-cleaned rack, has wished for a different one at one time or another. Those who contemplate the installation of a screen would do well to pay particular attention to the selection of the rack.

In the case of mechanically cleaned bar screens, a clear opening of 1" has been generally used and found to be quite satisfactory. There is, however, no reason why a smaller opening may not be used if deemed necessary due to any unusual conditions. A clear opening of $\frac{1}{2}$ " is the narrowest that is practical from a hydraulic standpoint, since the efficiency of that type of bar rack is very low. Bar spacing should be as large as practicable and the thickness of the bar as small as practicable in order to keep the efficiency high. For instance, a rack formed of $\frac{3}{8}$ " bars with $\frac{1}{2}$ " clear opening has an efficiency of only 57%. A rack formed of $\frac{5}{16}$ " bars with a clear opening of 1" has an efficiency of 77%.

Although it is important to remove all of the large solids which would be injurious to the equipment or to plant operation, at the same time it is equally important to select a bar spacing which will keep the amount of screenings to be handled to a minimum, and permit the debris of smaller size to pass through for ready treatment in the normal plant process. A 1" clear opening adequately meets these requirements. The smaller the opening between bars, the greater will be the amount of screenings accumulated, and the greater will be the disposal problem. A survey made a few years ago indicated that 42% of all installations checked were using a rack having 1" openings, and that with a 1" opening between bars, there will be accumulated between 3 and 5 cubic feet of screenings per million gallons.

Mechanically cleaned screens should be protected from large objects in the sewage, as by a coarse bar rack having openings anywhere from 2 to 4 inches. The amount of debris accumulated on such a rack is not great; but it serves to keep such materials as brick-bats, large heavy sticks, and bailing wire, off the screen

rack, and saves wear and tear, or possible breakdown of the unit. A coarse rack with 2" openings will not accumulate more than $\frac{1}{2}$ cubic foot of debris per million gallons of sewage screened, and the cost of the manual labor incurred by its use more than pays for the benefit received.

Many years of experience have taught us that the angle of inclination of a screen most desirable for assuring satisfactory operation is 60° with the horizontal. An angle of 75° is not too bad, but if anything steeper than this is used, difficulties in securing a clean discharge can be expected.

The inclination of a hand-cleaned bar rack should not exceed 45° . By keeping the angle at 45° or less, a greater rack area will be exposed to the flow and less frequent cleaning will be required. Further, the action of the flow itself will tend to push the accumulated debris up the bars, rather than through them.

Very often, sufficient consideration is not given to the cleaning cycle, and to the effect of proper cleaning on both the treatment plant itself and what may lay ahead of the treatment plant. In the case of racks cleaned by hand, the establishment of a definite routine is particularly important. Bar screens which are manually cleaned are usually cleaned spasmodically for the operator is not in constant attendance at the screen and usually cleans it whenever he has the opportunity, seldom more than two or three times a day and, because the cleaning is an undesirable job, it is often neglected. If the screen remains uncleaned for a considerable length of time, the sewage is apt to back up in the sewers and cause the deposition of grit which may give serious trouble. Then, too, when the screen finally is cleaned there is a noticeable surge through the plant which is very apt to disturb its normal, smooth operation. If the sewage enters the plant from a force main, the situation is not so bad, for then it would not be possible to back the sewage up in the sewers by reason of not cleaning the rack often enough. However, unless there is sufficient freeboard, there is danger that an overflow of the screen chamber may occur, causing considerable unsightliness and possible damage.

Mechanically cleaned bar screens can be regulated by automatic control to give accurate periodic cleaning and prevent any of the troubles mentioned above. After experimenting with various types of controls, Chain Belt Co. adopted the time clock control as being the most economical and most practical. Dual clocks are furnished, one to provide operation of the screen every 10 or 15 minutes during the day, and the other every 30 or 45 minutes during the night when the flows are lower. In combination with the clocks, an emergency float switch is furnished so that if the sewage should rise above a predetermined level because of a flash storm or some other unusual occurrence, the float would rise and set the screen in operation regardless of the position of the time clocks in their operating cycle. After a few days of operation of a mechanically cleaned screen, an operator will be able to establish a cleaning cycle which will keep the screen clean at all times, using a minimum of power. He should, of course, bear in mind that the season of the year greatly influences the sewage flow, particularly if treating a combined waste, and that the time clock setting determined to be best during some months of the year will not at all be correct for other months.

Those who have duplicate screening units are indeed fortunate, even though the second unit is nothing more than a hand-cleaned rack. Where such a condition exists, it is very important that the capacities are

known so that the second unit can be placed in operation at the proper time. By knowing the basis of design, an operator can always operate his equipment under optimum conditions and get the best out of it, and his plant.

Screenings disposal is a subject in itself, but certainly should be mentioned here. If grinding equipment is not provided, the operator must resort to either burial or incineration. Either method requires extensive handling and hauling of the screenings, both of which are very distasteful operations. Labor expense is also a factor of no little importance.

There are now two types of screenings grinders on the market, the hammermill and the Triturator. The latter is a positive shear machine, designed expressly for the cutting up of tough, fibrous materials such as rags and other debris normally found in sewage. It may be combined with existing equipment or used equally successfully with a hand-cleaned rack. It is important to check the teeth regularly and keep them sharp. Cutting efficiency falls off rapidly as the teeth become dull, with the result that the discharge material may not be ground fine enough to prevent trouble due to the clogging of pump valves, impellers, filter nozzles, and so on. Always have a spare set of teeth on hand and make the change whenever the teeth show the first sign of dullness. The teeth that accomplish the reduction of the solids by actual cutting are of exceptionally high quality material, and it will be found much more economical to have them sharpened often than to use them to the point where they become so blunt they must be thrown away.

The handling and disposal of screenings is a most distasteful job, and unless great care is exercised, a messy condition of both equipment and room will arise. An inspection of a great number of sewage treatment plants over the past eight to ten years has shown that the nice clean, bright looking screen room is the exception. There seems to be little attempt to keep an air of neatness about the place, and this is lamentable, particularly when it would take just a little time each day to do so. All operators should get in the habit of daily flushing down the floor and the equipment, particularly the rakes, dead plate, and other portions of the screen in direct contact with the screenings. We, and some of the other manufacturers, have done what we can to help this matter of cleanliness along by designing full housings for the screen, which remove all screenings from view.

The screen room is generally the point where the sewage is first released from the sewers. It is here that any gases are released to the atmosphere, including the corrosive hydrogen sulphide. It should be made certain that the room is well ventilated, and that painting is done regularly, using a good paint made by a reputable manufacturer.

One of the chief contributors to a messy screen room is a poorly designed screenings can. Very often the screenings can is anything that may be available around the plant. There is no drainage, no means of handling, and no thought given to size or weight. A long time ago, before the screenings grinder came into use, we built cans of several designs and decided upon one that seemed to us to measure up best to standards set by us. It is shown in figure 3 and may be used by any one who cares to. We will be glad to furnish a detailed shop drawing and bill of material.

A good looking piece of equipment is a badge of good housekeeping. A visitor must be impressed by the housekeeping if he is to spread the good word among the community. He is certain to be impressed

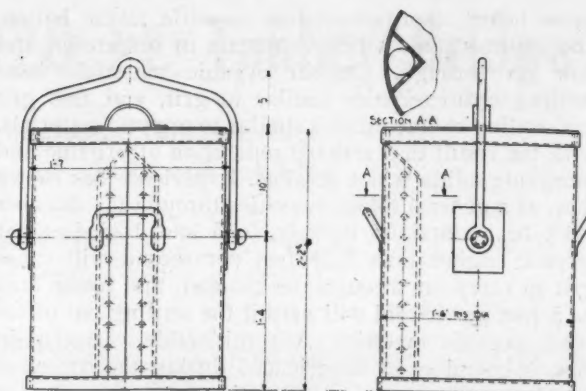


Fig. 3—Suggestion for a screenings can.

much more by what he sees than by what he is told about the quality of the effluent, which he cannot understand anyway. Figure 4 is a view of a mechanically cleaned screen taken several years after installation, and its appearance and general condition certainly speak well for the operator.

PART 2 — GRIT CHAMBERS

A grit chamber is used to protect the equipment which follows and to improve plant operation. Grit is particularly abrasive, and unless it is removed from the flow, subsequent plant units will deteriorate much more rapidly. The presence of grit in sewage will cause the rapid wearing out of pump valves, impellers, and other parts, the wearing out of the shoes on the conveyor flights, and faulty digester operation.

Grit is certain to be present in sewage, the amount of it depending upon the type of sewerage system, the condition of the system, type of soil, the types of street surfacing, the efficiency and method employed in cleaning the streets, and the violence of storms. For a plant treating a straight domestic sewage, the above factors can be narrowed down to possibly the condition of the sewer system, and the type of soil. Infiltration is always a source of a lot of grit, as are the wastes from many commercial houses and industrial concerns.

A grit chamber is a tank or chamber so designed hydraulically that the velocity of flow through it will

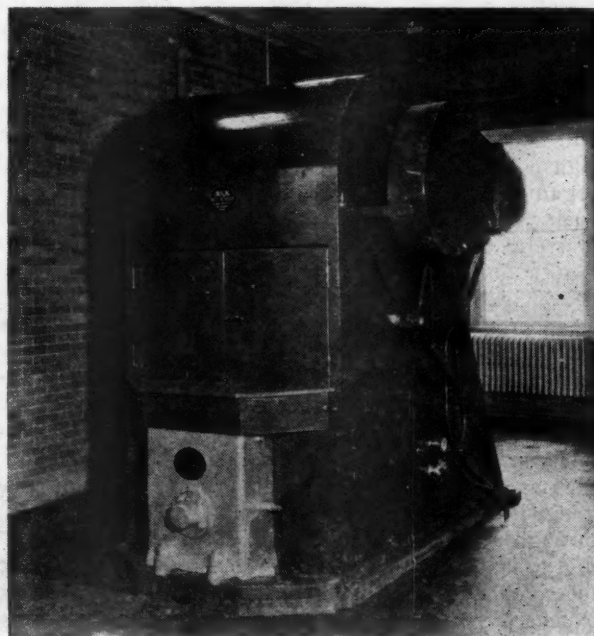


Fig. 4—Enclosed mechanically cleaned screen.

cause heavy, inorganic solids to settle to the bottom and light organic solids to remain in suspension and flow on through. Certain organic materials have settling characteristics similar to grit, and fine grit has settling characteristics similar to organic materials, with the result that a sharp separation of organic and inorganic solids is not possible. Experience has shown that, as a general thing, velocities through the chamber must be maintained between 0.75 and 1.25 feet per second; higher than 1.25 feet per second will cause grit to carry on through the channel, and lower than 0.75 foot per second will permit the settling out of too much organic material. A considerable variation in flow is bound to be experienced during the course of the day, and particular precautions must be taken to provide a unit or units that will operate as efficiently as possible over the entire range in flow.

There is a very definite relationship between the effective water depth in a grit chamber, the length of the chamber, and the velocity of the sewage. No longer is a grit chamber designed on the theory that a one minute detention period is desirable, and the length therefore made 60 feet because the velocity is one foot per second. All of the mentioned factors are now taken into consideration. All grit particles have a definite subsiding velocity, and it is on the basis of this velocity and the predetermined required sewage depth, that the length of a grit chamber is based.

In general, grit chamber designs are based on the removal of all grit down to 50 to 60 mesh, or particles not less than .25 millimeters in diameter. Our experience has been that grit finer than this does no particular harm when it is permitted to go on into the treatment plant proper. The finer the particle it is desired to remove, the larger will be the grit chamber and the greater will be the investment.

We cannot maintain a constant flow through a grit chamber but we can maintain a velocity reasonably close to the desired value of one foot per second through the use of the proportional weir or some other mechanical aid. Even doing that will give no assurance that only grit will settle out and all the organics will carry through the chamber. As the sewage flow drops below normal, it is obvious that the sewage depth will decrease. As the sewage depth decreases, the grit channel then becomes actually too long and considerable material will settle out that would otherwise reach the end of the grit chamber before it was ready to settle on the bottom. Such material will consist almost entirely of lighter organics and finer grit particles of the same settling characteristics. Actually, organics will be settling out all the time, since any basis of design is predicated on the assumption that all grit and organics enter the grit chamber at the surface. Obviously, this is not the case, as the grit and organics must be distributed throughout the sewage. The organics that enter the chamber relatively close to the bottom will thus settle out before they reach the grit chamber exit, particularly if their specific gravities are near that of the grit itself. In any plant, it undoubtedly has been noticed that, when the grit equipment is started up in the morning, the grit is very heavily loaded with organic materials. If this grit is recirculated to the channel during periods of normal flow, such as occur during the mid-morning hours, the true grit will resettle and the organics will be carried on through and out of the channel. In other words, washing to a certain extent can be accomplished within the chamber itself and there is no need to provide an expensive piece of equipment to do the washing separately. A grit of consistently less than five per

cent putrescible matter can be produced in this manner, and it seems very questionable that it is worthwhile to use separate grit washing to produce a grit of one or two per cent putrescibility that may still be just as odorous upon decomposition.

Multiple channels afford natural flexibility and also can be used to control velocity. Almost all plants except the very small ones, particularly where treating combined flows, are designed with duplicate channels, or even a greater number. A much greater range can then be handled successfully, for additional chambers can be cut in as the load increases, and cut out as the flow subsides. Of course, the operator must know the capacity of the grit chambers, be familiar with the hydraulic characteristics, and know when to put them in and take them out of service.

Another important factor in the successful operation of a grit chamber is the method by which the sewage is brought in. A straight sweep into the grit chamber is a prerequisite to good operation. If the sewage is brought into the chamber around a bend, the sewage will pile up along one wall and short-circuiting is sure to result. In addition to that there will be a zone of quiescence, on the opposite wall for a large percentage of the length, and considerable organics will settle out over that area. If a curved approach channel is necessary, a simple dividing baffle wall, such as is shown in Fig. 5, will cause a marked improvement in tank performance.

If equipment that collects the grit and elevates it out of the sewage to the point of discharge is in use, the sewage may dip into the buckets as they break the surface and wash the grit out and back into the channel. This can be effectively combated through the use of suitably designed inlet baffles. A typical method of control is shown in Fig. 5, an equilateral shaped baffle being installed with one side parallel to the upcoming bucket, and with a length about $\frac{2}{3}$ of the bucket length. The grit thus actually leaves the sewage through a quiescent zone. Although there is still some washing out at the very ends of the buckets, the amount lost is not appreciable, and is picked up by subsequent buckets.

(Continued on page 58)

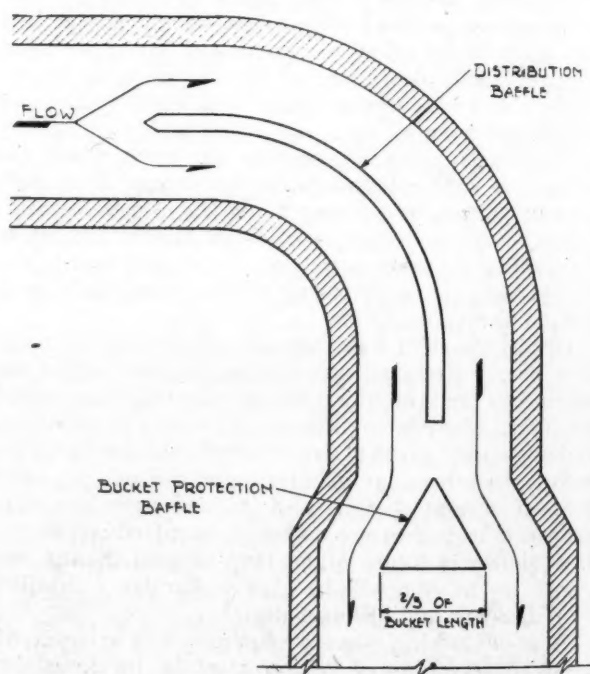


Fig. 5—Baffle wall on curved approach and bucket protecting baffle.

The Construction of a 220 Ft. Timber Bridge

Old, unsafe structure replaced with a creosoted timber bridge, as war-time restrictions prevented use of reinforced concrete.

By WALTER A. KING*

County Engineer, Shawnee County, Kansas

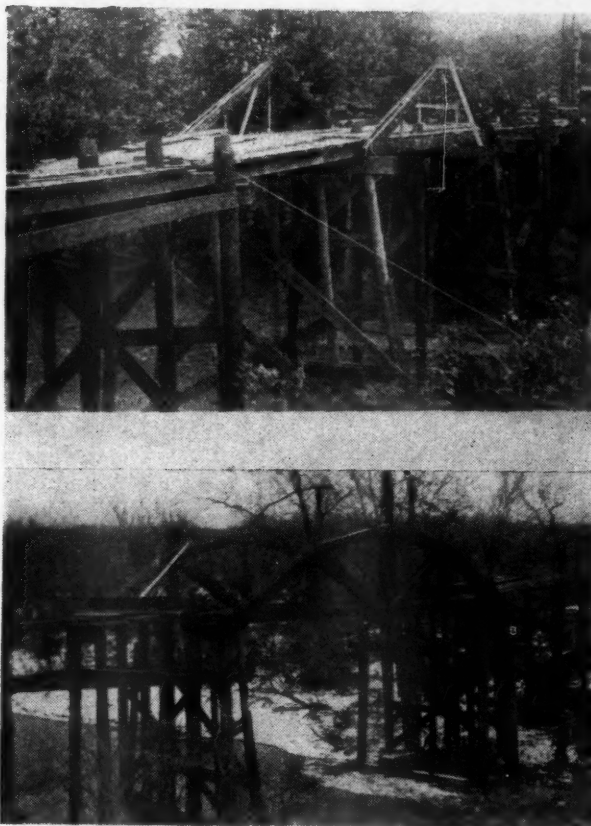
SHAWNEE COUNTY has the responsibility of maintaining some 1150 bridges, including, in addition to the bridges on its own road system, all structures over 5 ft. span on the township roads.

The bridge whose construction is described below crosses Wakarusa creek at a point where the drainage area is some 108 square miles of what may be classified as rolling land. The channel at this location is well defined, with high banks and a waterway that carries the water except after rainfalls exceeding 4 inches in 24 hours, when the water leaves the channel and spreads over the adjoining low lands. The existing bridge had been declared unsafe and was closed to traffic in May, 1944, and it was necessary to reconstruct it at once.

A set of plans for a reinforced concrete structure had been prepared by a previous engineer, but war-time restrictions made it impracticable to build such a structure and plans were drawn for a bridge with a total length of 220 ft. consisting of one 40 ft. wooden truss and nine 20 ft. approach spans. The total length of 220 ft. is 10 ft. longer than the old bridge and also about that much longer than the distance between the high banks. Since the bridge is located on a township road with low traffic count, a 16 ft. roadway with H15 loading was provided. In determining the grade for the new bridge, we placed it one foot above the known high-water mark. The approach grade on either end is 0.25% for 40 ft. and 4% and 3% beyond that on either end, while there is 0.2 ft. camber in the structure.

Each bent for the approach spans consists of five creosoted piles, driven to refusal in clay, with a 3" x 10" creosoted, yellow pine, boxed cap. The two bents carrying the truss each had an additional three piles on either end, forming a diamond shape shoe for the end of the truss. The piles in these two bents are set 3 ft. in rock and encased in concrete. Two of the old bents, which had previously been renewed with

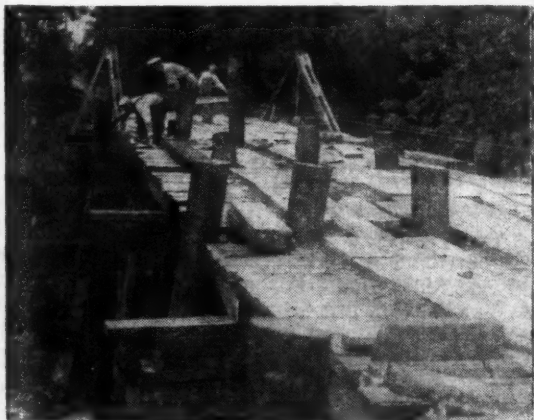
* Mr. King is Acting President of the Kansas County Engineer Assn., and Director of the County Highway Officials Division.



Top—The old bridge. Bottom—The new bridge under construction.

creosoted material, were utilized by adding one pile and raising to grade.

The 40 ft. pony truss consists of four 10 ft. panels and is constructed of 3" x 12"s and 4" x 12"s, being designed to use Teco ring connectors. The pieces for the truss were cut to size before being treated at the plant with 10 lb. of creosote oil. The trusses were as-



Showing piles driven through old deck.



Laying the laminated deck.



Walter A. King

sembled in the county shop during the winter and trucked 13.5 miles to the bridge site. The floor chords for the truss consisted of two 15"-50 lb. channels bolted to the upright members of the truss. Channels were used to save head room and also due to the scarcity of heavy timbers.

The floor system consists of a laminated deck of 3" x 10" x 20 ft. creosoted yellow pine laid on edge. These are staggered with one-third of the joints breaking on the center of the bent, and

the one-third on either side breaking joints 4 ft. from the center of the bent. A 6" x 8" hub guard provides opportunity of covering the deck with 3" of pit-run gravel for protection from weather and tractors with lugs.

The hand rail consists of a top rail of 3" x 3 1/4" x 5/16" angle, while the lower rail is a 5" channel. Both rails are welded to 3" x 4" x 1/2" angle posts, spaced 10 ft. apart and fastened to the floor system with 1/2" x 8" lugs.

The old bents and deck were left in place to use as a platform in driving the piling. The county has a pile driver 40 ft. high which we constructed ourselves, using a 1500 lb. hammer and a two-drum Sampson hoist powered with a Hercules motor.

The acute labor shortage was the greatest handicap encountered. At no time did we have more than 8 men on the job and many days only 3 besides the foreman. Work had to be stopped many times to permit making minor repairs to other bridges to keep them open. Some time and labor were saved by connecting to a power transmission line that ran by the job and using a power auger for boring holes. Actual construction was started in August, 1944, and the bridge was opened to traffic in April, 1945.

The total cost of the job was \$12,444.71, divided as follows:

Material	\$ 7,321.57
Labor	2,985.14
Equipment rental	938.00
Supervision	1,000.00
Plans	200.00

\$12,444.71

This gives a cost of \$56 per running foot, for a bridge that will adequately meet the needs of the traffic and will serve for many years to come.

Traffic Survey in Wayne County

(Continued from page 20)

age number of vehicles per 24-hour period. The results obtained have been highly satisfactory and have furnished valuable highway engineering data. The counters used were manufactured by the K-Hill Signal Company of Uhrichsville, Ohio, and the (Traffic-counter Jr.) Streeter-Amet Company, Chicago, Illinois.

It would seem that most counties having a situation similar to that of Wayne County need traffic surveys to clarify their problems and to obtain the information needed for a successful solution of them. Of considerable importance is the fact that adequate traffic information will justify highway expenditures before

the public and meet any unfavorable criticism of the programs planned by highway authorities. From the highway engineering standpoint, the survey shows traffic flows, and aids planning improvements for a proved traffic need.

Wayne County recommends to others the full use of the facilities of the Ohio Planning Survey, or its equivalent in other states. Splendid cooperation was given by the Planning Survey officials and staff.

Wayne County Highway officials include: M. C. Ebright, Chairman of the Board of Commissioners; D. W. Buchwalter and Frank Taggart, Jr., the other members of the Board. In the County Engineer's Department, the writer is County Engineer, H. M. Lear, Chief Assistant Engineer and G. C. Slater, Assistant Engineer.

Improved Refuse Collection Service in Chicago

Chicago is preparing to improve its refuse collection service as soon as the necessary containers, collection equipment and men are available. Lloyd M. Johnson, Commissioner of Streets and Electricity, in reporting on the subject, made recommendations of which the following is a summary:

1. Municipal service should be furnished to all residential buildings containing fewer than 5 flats and to larger tenanted buildings which are not centrally heated. All other types of buildings must provide for sanitary collection and disposal themselves or by some agency other than the city.

2. Proper containers are essential. They should be between 20 and 30 gallons capacity. There shall be not less than one container for each family unit or each five persons. The building owner shall be responsible for the furnishing of the containers. That the city purchase and distribute containers at cost. That an effective publicity program be initiated. That a police officer be made available to ward superintendents to aid in enforcement.

3. That operations be returned to a one shift basis as soon as equipment is available.

4. That all municipal equipment be of the enclosed type with easy loading facilities.

5. That private scavenger contractors be also required to use enclosed sanitary equipment and that 3 years be allowed for conversion. That private equipment be inspected by the Bureau of Streets. That a system be installed that will plainly identify all places subscribing to a private scavenger service. That the license fee per vehicle be increased to cover costs of inspection of equipment and follow-up of complaints.

Bids have been asked for 30,000 cans, which the city will distribute in one of the districts most in need of them; and later will make a survey to ascertain what change has been made thereby in sanitary conditions and cost of collecting.

Prices of Construction Equipment

A survey of prices of construction equipment made by the Department of Labor in June showed most of them higher than in 1941. Track-type tractors had increased 15.8%; material processing equipment, 14.5%; power cranes, draglines, shovels, etc., 10.4%; tractor-mounted equipment, 9.7%; scrapers, maintainers and graders, 7.5%; mixers, pavers and spreaders, 5.7%. On the other hand, prices for drilling and boring machinery had not increased, and those of portable air compressors had dropped about 2%.

Lay-Out of Sewage Treatment Works

Suggestions by an English engineer for the arrangement of the various features of a plant with a view to appearance, economy of construction, convenience of operation and future extension.

An article describing "common errors found in one particular aspect of municipal engineering, the lay-out and pipe work of sewage treatment works," by L. B. Escritt, was presented in a recent issue of the London weekly, The Surveyor, as an aid to young English engineers. Most of it is equally applicable in this country and the following condensation is believed to be worth careful consideration by American engineers who have had little experience in this field.

THE SITE having been selected, the designer should fit each structure to the contours of the land, arranging their positions according to the hydraulic gradients through the works. At the same time he endeavors to economize in the use of land, labor and materials, and to arrange a plan that will give the future operator the shortest journey from point to point during his daily tasks.

This is the ideal, well achieved in good works; but unfortunately the lay-out is frequently more open to criticism than many other parts of the design. Too often the designer uses the boundary of the land as a frame in which he so spreads out the components as to occupy more space than need be, orienting the lay-out in accordance with the contours with a view to economizing in excavation. The result is an untidy and unsightly irregular juxtaposition of filters and tanks of all sizes, with no possibility of making future extensions without abandoning some or all of the origi-

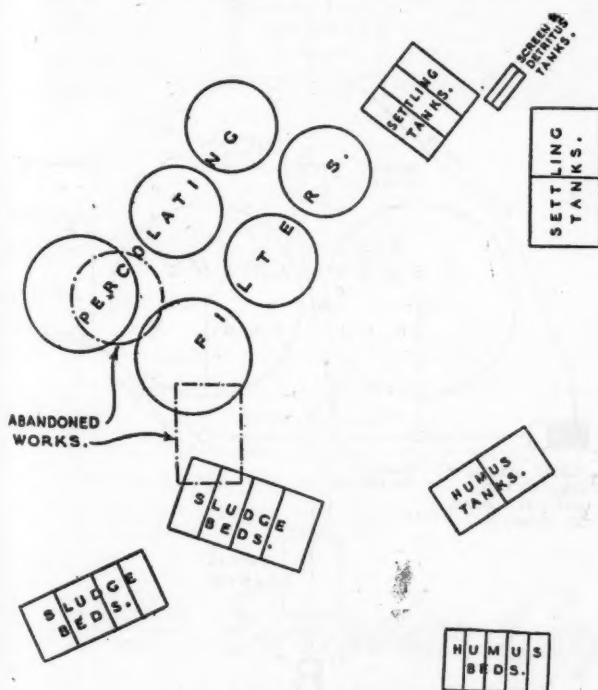


Fig. 1—Untidy arrangement of filters and tanks.

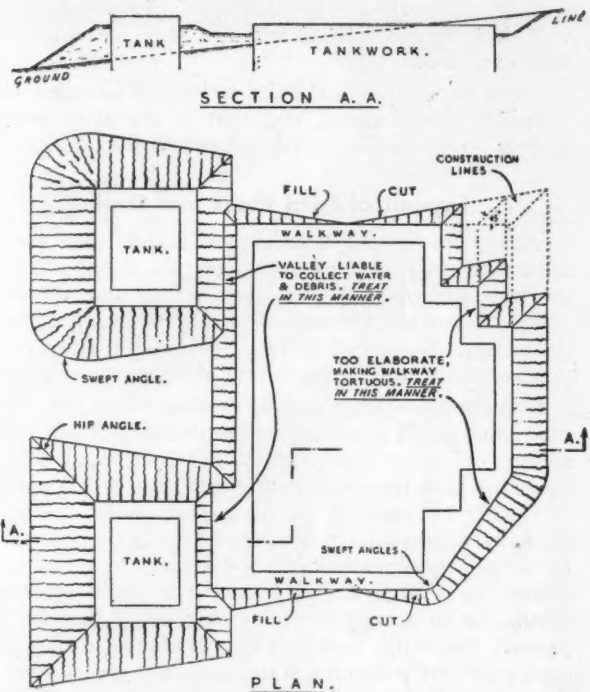


Fig. 2—Desirable and undesirable arrangement of embankments.

nal structures. Fig. 1 by no means exaggerates the kind of lay-out produced in this manner.

The amount of space required between and around the components of the works for purposes of construction and operation is quite small. It should not be more than the walking and working space necessary at the crests and toes of embankments between the earthworks and the tanks, etc., together with the space occupied by the embankments themselves. Moreover, spacing out the works often introduces problems relating to pipe gradients, etc., that could have been avoided with a more compact lay-out, and adds to length, and therefore cost, of pipe work.

Embankment Plan

The formation of embankments has a lot to do with the general appearance of the completed works and the cost of earthworks. In by far the greater number of sewage treatment works the excavated earth can be disposed at a minimum cost in the embankments without the necessity of providing spoil heaps or the expense of carting from the site. Spreading earth other than in the embankments is not good, because it produces "made ground," adding to the cost of future works. The designer should therefore always attempt to obtain a perfect balance of "cut and fill" and proportion his embankments accordingly.

The style in which embankments are treated varies considerably. There are many ways in which slopes may intersect. Some designers prefer to follow closely the outlines of the tanks, others to frame the tanks in

a simple rectangle of neatly trimmed earth, some like sharp hipped angles, others circularly swept angles. All methods are legitimate; some are better than others from the aesthetic point of view. But on no account should the designer be content to show vague outlines because he is not sure how the outlines will appear on plan or what are the true representations of the intersections, for the earthworks will not appear well formed unless properly executed by the contractor, and the contractor cannot be blamed for a bad job if he has to work to an incorrect drawing. The proper intersections of complex embankments are very interesting, well deserving of study, and are very pleasing when well executed.

There is one practical point to be kept in mind when forming embankments, and that is the avoidance of valleys where surface water or debris may collect.

Lay-out of Feed Pipes and Drains

Pipe work should be designed to facilitate the utmost flexibility. All operators do not think alike regarding the operation of the works, and therefore every reasonable alternative should be catered for in the design. Moreover, there is the possibility of emergencies which might necessitate abnormal operation.

If there are sludge and wash-out pumping stations, the rising mains should be so interconnected that either sludge or other liquids may be discharged to any process where they will not be harmful. For example, it should be possible to discharge crude sludge to primary digestion or, by-passing primary digestion, to secondary digestion or, by-passing digestion altogether, to sludge drying beds. The digestion tanks should be so arranged that either stage may be by-passed. Similarly, humus, after discharge to the general wash-out pumping station, should be capable of delivery to the incoming flow of sewage so as to settle

out in the sedimentation tanks, or, alternatively, of being passed to digestion tanks or sludge drying beds. The sludge pumping station should be able to serve not only for the purpose of pumping crude sludge to the digestion tanks but also as circulating pump to stir up the digestion tanks as may be found desirable, or as a standby to relieve the general wash-out pumping station in case of breakdown. In view of the possibility of pumps having to serve different purposes, rising mains should be short because, on the commencement of pumping, there is always the contents of the rising main to be discharged and this may be a liquid not suitable for discharge to the section of the works in question, if in large quantity. If the rising main must be long, arrangement should be made for it to be emptied back to either suction well, and the wells should be made to ample capacity accordingly.

All drains should be laid to suitable gradients according to the liquid that will pass through them. Those of the wash-out drains liable to discharge crude sewage should be laid to gradients that will give a velocity of $2\frac{1}{2}$ ft. per second; those that will only have to discharge liquids comparatively free from solids may be laid to slacker gradients, but preferably to gradients sufficient to give velocities of not less than 2 ft. per second. In English practice it is usual not to lay any sludge pipes to a gradient of less than 1 in 100. In America a gradient of 1 in 30 has been recommended for sludge drains and as far as practicable this rule might be adhered to, particularly as regards drains for digested sludge.

The general lay-out of feeds and drains is a simple matter, and yet frequently drawings are prepared which show most extravagant arrangement of both rising mains and drains. A common fault is an attempt on the part of the designer to make the drainage plan

(Continued on page 64)

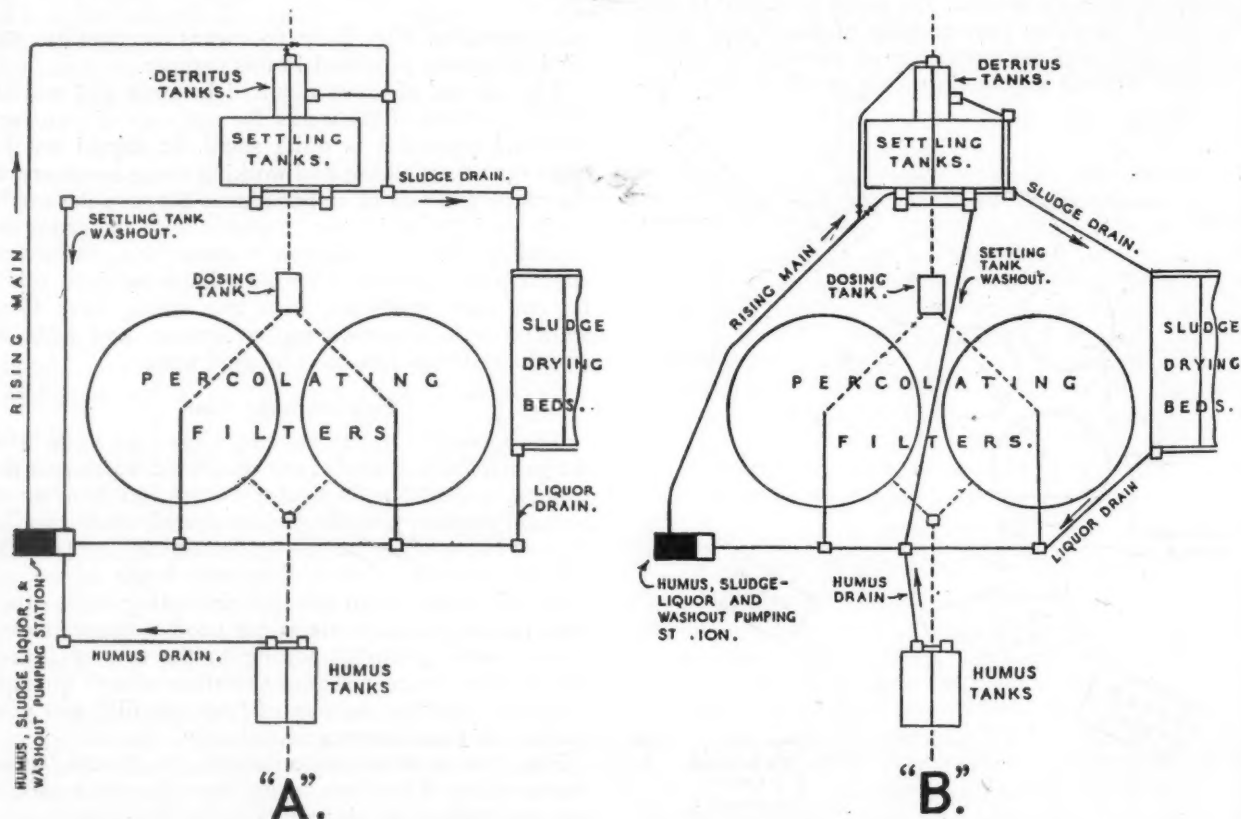
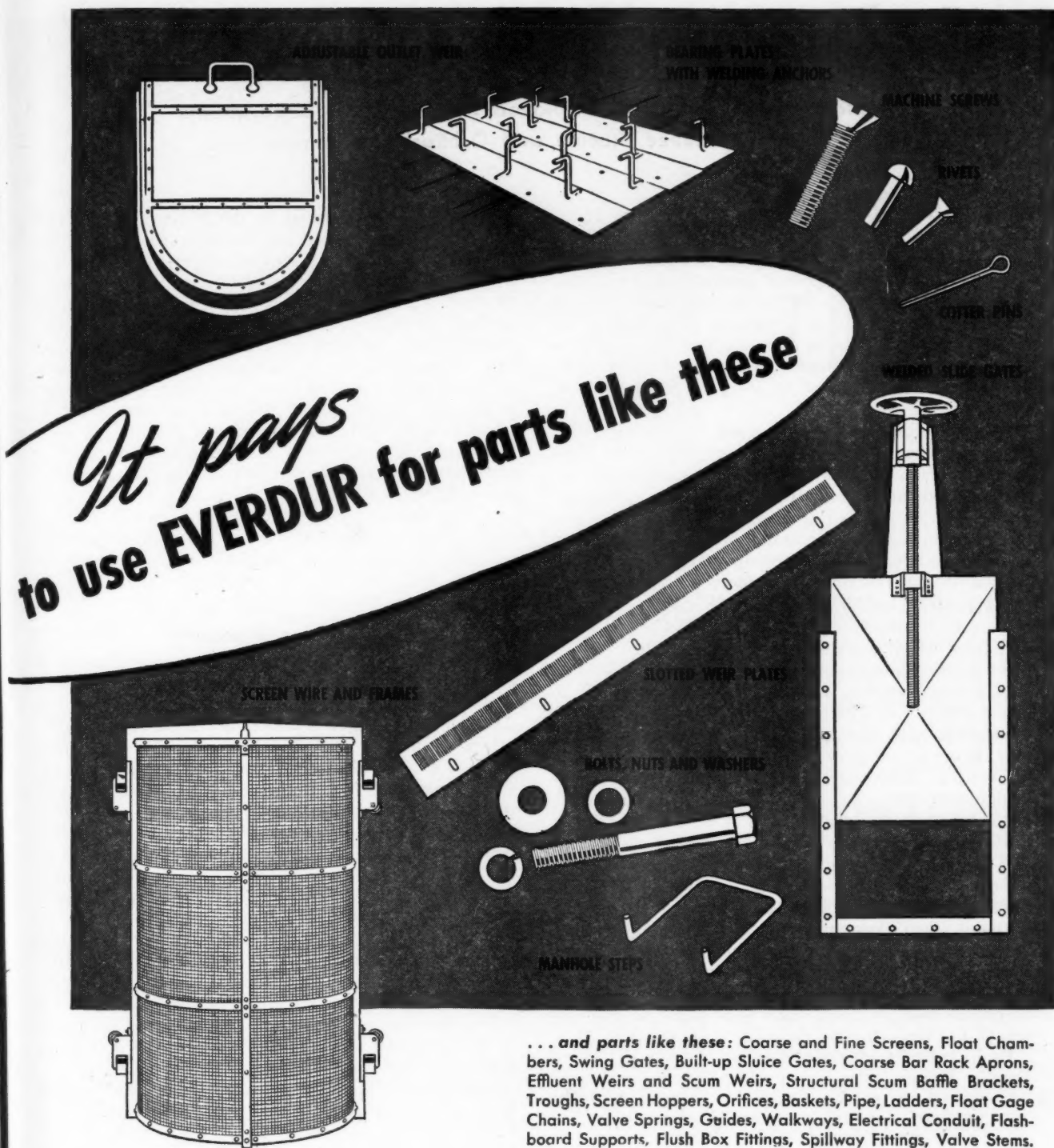


Fig. 3—Two alternate arrangements of piping for a given layout of structures.



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Feeding Activated Carbon in Three Cities

Methods and equipment employed by the water departments of Milwaukee, Racine and Oshkosh, Wisconsin.

AT THE Milwaukee Water Purification Plant, threshold odor tests are run every two hours at a temperature of 60°F., and if the threshold odor is over 4, activated carbon is applied promptly at 20 lb. per m. g., being increased 10 lb. for each unit increase above 4. Once the plant is seeded with carbon, the dose is adjusted so as to maintain the threshold odor of the effluent at 2 or less. A minimum dose of 20 lb. is used, as smaller doses do not give enough benefit to warrant the cost.

Dry chemical feeders were used for the carbon at first; but when these were operating at nearly their maximum capacity it was necessary to shut each one down periodically for cleaning; reducing the feeding rate below that needed on many occasions. Therefore it was decided to use, instead, solution tanks similar to those installed at the softening plant of the Metropolitan Water District of Southern California. This plant is described by James E. Kerslake, superintendent of filtration, in *Taste and Odor Control Journal*, from which the following is abstracted.

Two steel solution tanks were installed, each with 8 ft. inside diameter, a height of approximately 7 ft. and a capacity of 2,000 gal. to the overflow line. Each tank is equipped with a "Lightnin'" mixer, the paddle shaft being set at an angle of approximately 20° with the vertical. Each shaft carries 2-bladed paddles 11" in diameter, one approximately 2 ft. from the bottom of the tank and the other about 1 ft. below the overflow line. These are operated by 3-hp motors at 1750 rpm.

After passing through a rotometer, water enters the solution tank through sprays at the top. The mixture leaves the tank through one of a vertical row of five 3" holes, then flows up in a semi-circular channel welded to the outside of the tank, over a weir and down into a 3" copper pipe. The solution can be withdrawn through any of the 3" holes; normally the center one is used. A drain valve is provided in the bottom of the semi-circular channel.

Each tank is charged through a dump hopper directly above it, the top of which is connected to a

carbon dust filter located in the tower above. When the hopper is being charged, air is drawn through the charging door by means of a blower located on top of the dust filter, thus appreciably reducing the amount of dust. Each tank receives a charge of 2,000 lb. of carbon, giving a concentration of 1 lb. per gal. The flow of water through the tank is kept at a constant rate; when 10% of the carbon in the tank has been removed and the concentration reduced by that amount, it is restored by adding 200 lb. of carbon. That is, when feeding carbon at the rate of 200 lb. per hour (200 gal. of water per hour) the tank would be charged every two hours; at 800 lb. per hour, charged every 15 minutes.

When starting up a tank that has been idle, it takes 10 to 15 minutes to produce a uniform suspension; but not over five minutes when the 200 lb. charges are applied. All lines are flushed for not less than 10 minutes after taking the tanks out of service.

At Racine, Wisconsin

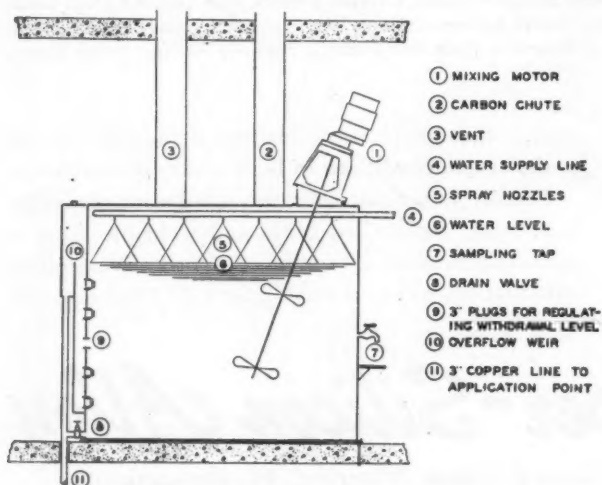
The Racine, Wisconsin, Water Department designed carbon feeding equipment which contains several new features and which was constructed in their own shop. The charging hopper is a rectangular sheet-metal container which will hold four bags of activated carbon, each in a cell which is open at both top and bottom, the four cells being supported on a shaft which is revolved by a large hand wheel attached to its end outside the housing. A charging door in the top of the housing is opened, a bag of carbon placed in each of the four cells and bars placed across the ends to hold them there. Then the ends of the bags are slit open, the charging door clamped down to an air-tight fit, and the bags turned upside down by means of the hand wheel, and shaken to empty them. An electrically operated agitator taps the side of the hopper to prevent arching. During the entire charging operation a partial vacuum is maintained in the hopper by means of a suction fan, which draws the air from it through a multiple-bag trap.

The hopper discharges into a Syntron feeder hopper, with which it is connected by rubberized fabric. The feeder trough is covered with transparent plastic and is connected to the mixing funnel by means of a rubberized fabric tube.

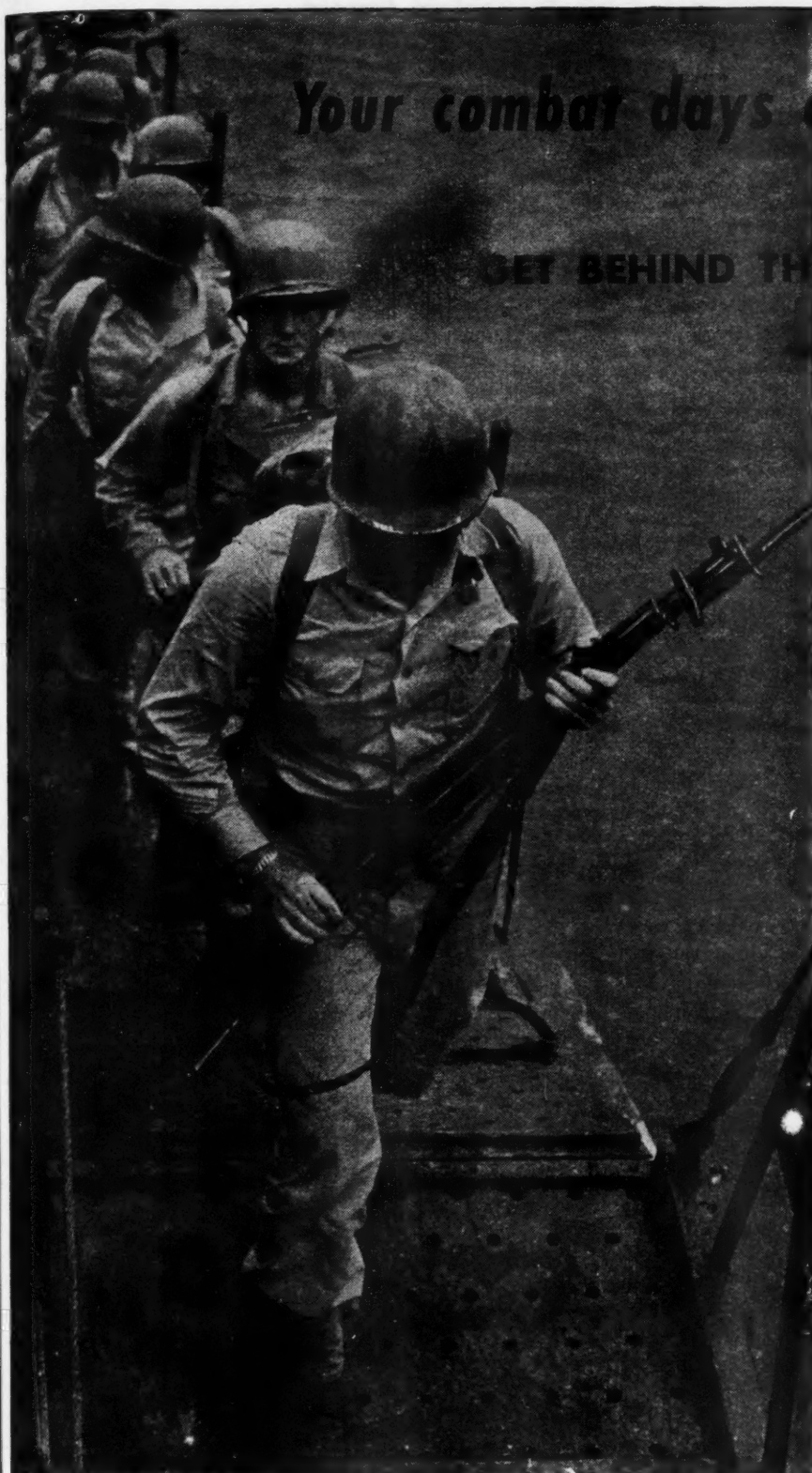
The manager of the Racine Water Department, Walter A. Peirce, says that "one of the ideals toward which the waterworks man strives is to devise equipment for feeding activated carbon which will be so dust free that the operators will fight for turns at charging it. Although this ideal has not yet been reached at Racine, we feel that our installation includes a number of features which eliminate many of the difficulties usually encountered."

In *Taste and Odor Control Journal* H. J. Schneider, Superintendent at the Oshkosh, Wisconsin, plant, describing their method of handling powdered carbon, says:

The powdered activated carbon requirements of the City of Oshkosh are purchased on a yearly contract basis and are shipped by the producer in 20-ton car-



Activated carbon mixer used in Milwaukee.



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loads, as needed. The carbon is packaged in standard multi-wall 4-ply paper bags.

The carbon is stored in the chemical room which is located on the second floor of the filtration plant. A one-half ton traveling electric hoist mounted on a mono-rail is provided to carry the carbon to the storage room. Two slings made of 10" belting are used to pick up the bags. These slings are capable of carrying fifteen bags of carbon or ten 100-pound bags of alum. The bags of carbon are stacked in rows on the floor. Each stack is carefully counted and is equivalent to one 500-pound filling of the carbon feeder. In this way confusion and errors in charging out the chemicals from stock are eliminated, as the operator uses an entire stack for each filling.

The powdered carbon is fed to the raw water prior to its entrance into the rapid-mix tank. It has about three minutes contact with the water before the alum is added.

The filtration plant is equipped with one 100-pound per hour gravimetric carbon feeder, one 100-pound per hour volumetric carbon feeder and two 20-pound per hour volumetric carbon feeders. (The volumetric feeders can also be used to feed alum or lime.) Each feeder is equipped with a hopper which holds enough chemicals for several hours operation. The hoppers extend through the chemical room floor to the feeders. The top of the gravimetric feeder hopper is three feet above the floor and is enclosed in a dust-proof cabinet. This cabinet is ventilated through a dust removal system. The tops of the other feeder hoppers are about 20 inches above the floor. The chemical bags can be easily emptied into the hoppers. A hinged cover and dust removal system is provided for each hopper.

The dust removal equipment is essentially a water jet connected to one branch of a 4-inch malleable iron Y-bend. The other branch is attached to a 6-inch galvanized iron conductor pipe. The high-velocity jet creates a suction through the conductor pipe. The jet and the conductor pipe discharge through the single outlet of the Y-bend into the sedimentation basin.

The conductor pipe runs to each hopper and is attached to it by a 6-inch galvanized iron riser pipe. Each riser is provided with a damper to permit shutting off when not in use. All joints are soldered except those which connect the risers with the conductor pipe and the one which connects the conductor pipe to the 4-inch Y-bend. These joints were unsoldered and a piece of automobile inner tube, about 12 inches long, used to make the joint. This arrangement simplifies the taking-down of the pipe for cleaning and still provides an air-tight joint. The piping needs to be cleaned every three or four weeks. The dust removal system is simple, economical and efficient.

Higher Water Rates Beyond City Limits

Yakima, Washington (27,221), according to a decision by the superior court of Yakima County on June 14, may charge higher rates for water outside the city limits than for water delivered to residents, and the city has a right to discontinue furnishing water outside the city limits upon giving reasonable notice. The court stated that through property taxes the water customers inside the city had borne the financial burden of acquiring the system, and also that the costs of billing and collecting water charges were higher for outside customers. A survey of water rates made by the League of Oregon cities several years ago showed that most Oregon cities charge from 10 per cent to 25 per cent more for water service outside the city limits.—*Public Management.*

Paving Brick Research

The Paving Brick Institute, a national association of the manufacturers of paving brick, with offices at 1756 K Street, Washington 6, D. C., is completing plans for an extensive research program at one of the midwestern universities. The program is designed to study latest technological developments in the manufacture and use of paving bricks.

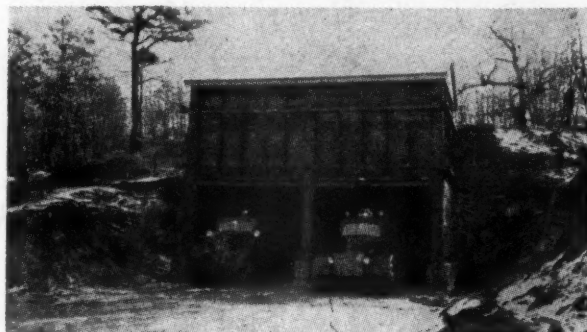
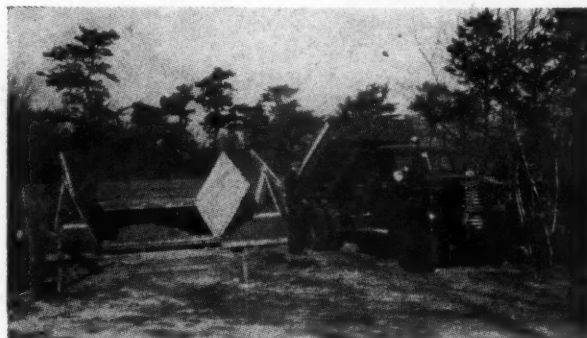
Highway Notes From Rhode Island

The following paragraphs are excerpts from the Ninth Annual Report of the Department of Public Works of the State of Rhode Island.

This year we armor-coated one mile of road at Nayatt Point, built about thirty years ago with a very high crown, which had become dangerous to travel when the surface was wet or icy. The crown was reduced by building up the sides with crushed stone. The entire surface was then treated with asphalt and pea stone and we thereby obtained a fairly non-skid surface on which motor vehicles could travel in comparative safety. The area covered was 25,815 square yards.

We have just completed the construction of another sand storage bin located on State property opposite the State Police Barracks at Scituate. This bin is of 130-cubic-yard capacity and it will be of great assistance to us in sanding roads in that area this winter. It is the intention of the Department to build several more of these bins throughout the State as soon as the materials are available.

This department replaced 16,000 feet of rotten and decayed guard rail this year, but this amount only represents a start on the total that is in bad condition and needs replacing. As soon as materials are available the remainder of this guard rail should be replaced with steel cable and concrete posts.



Storage bins holding treated sand for spreading on icy roads in Rhode Island. Above, filling bins. Below, loading sand into trucks.

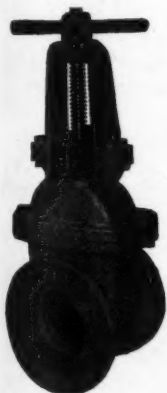


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The New York-New Jersey-Connecticut Interstate Sanitation Commission

Cooperation of the states has been successful, in spite of war restrictions on construction, in greatly reducing the pollution of interstate waters. Results and some details of operation.

THE states of New York, New Jersey and Connecticut have a common problem in the abatement of the pollution of the waters of Long Island Sound, New York Harbor and the bays and estuaries connected therewith. The solution of this problem calls for cooperative action, and to effect this these three states have organized an Interstate Sanitation Commission. This has now been operating for seven years, and the result at the end of 1944 is told in detail in their annual report for that year.

The principal item of the compact endorsed by them was one fixing certain limits to the pollution caused by sewage from each of more than 200 municipalities and other contributing districts, with a total population of 10,900,000. When the Commission was organized about 200 mgd of this sewage was being treated, but by 1944 this had been increased to 525 mgd. Moreover, in 1937, of the 200 mgd treated, only 20 mgd met the compact requirements; while in 1944, 430 mgd met the requirements. Or, stated in another way, in 1937, of the approximately 1000 mgd of sewage reaching the interstate waters, practically all failed to meet the compact requirement, but in 1944 this unsatisfactory effluent had been reduced by 430 mgd, or more than 35%. The progress made each year is shown by the diagram. The recession in satisfactory treatment in 1942 was due to war conditions,

chiefly scarcity of chlorine. It is probable that, had it not been for the war, the improvement during the past four years would have been considerably greater.

In 1937 the sewage of only about one-fifth of the population was treated, but in 1944 about one-half was treated, 82% of it satisfactorily meeting the compact requirements.

The policy of the Commission from the beginning has been one of "seeking the cooperation of municipalities after having informed them of the objectives of the Commission. This policy has proven fundamentally sound in that substantially every municipality with which the Commission negotiated has recognized the desirability of the pollution abatement program and has conformed thereto insofar as conditions permitted."

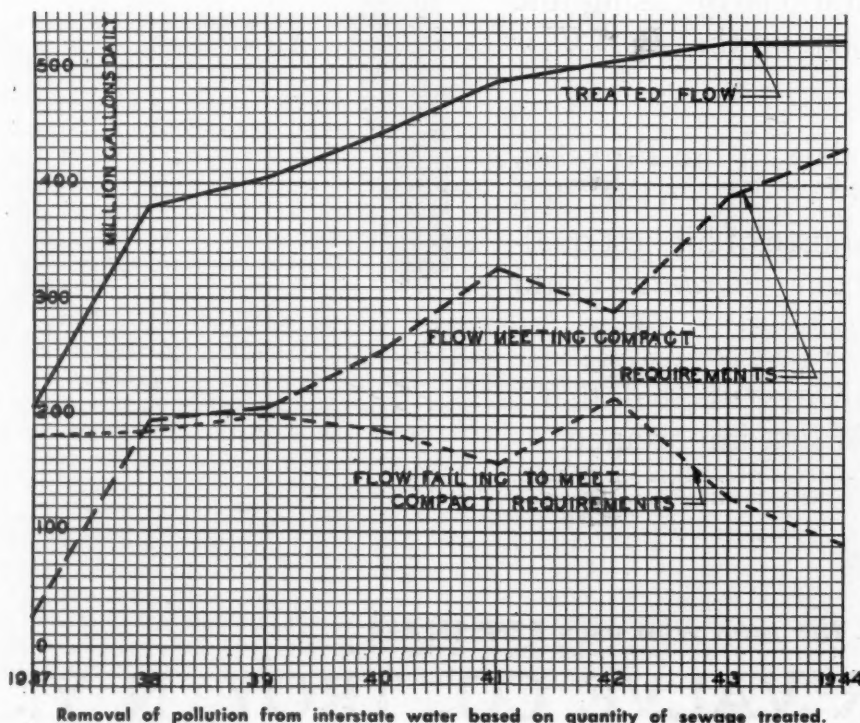
"During its entire existence the Commission has not been required to resort to court action to obtain compliance with its program in a single instance.

"The Commission has been instrumental in safeguarding the present quality of the waters of the District by calling attention to violations caused by operating procedure as well as by discouraging the discharge of untreated sewage and by taking steps to advance the completion of a treatment plant.

"The wholehearted manner in which the municipalities with which the Commission has negotiated, have joined in the effort to maintain the Commission's program and objectives, speaks well for the approach adopted by the Commission."

The cooperation obtained by the Commission probably is due, at least in part, to the fact that it is composed exclusively of representatives of the three states, who report to the three governors. It may be questioned whether a Federal authority would have received equal cooperation. (No suggestion of this is expressed in the report, however.)

The compact between the three states "establishes standards of treatment required before polluting matter may be discharged into the Interstate Sanitation District," these standards being based on the removal of certain percentages of suspended solids and of coliform organisms, the percentages varying with the class of the diluting water. Plants complying with these standards are given Rating I.



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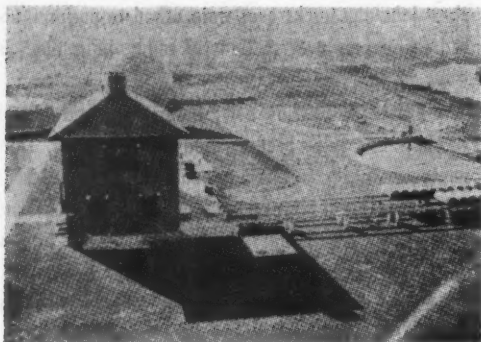
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Treatment
plant at
Stamford,
Connecticut.

Plants which fail of compliance by a small margin, or where minor additions or changes may be expected to enable the plant to meet compact requirements, are given Rating II. Rating III is given to plants that require major additions or modifications before satisfactory treatment can be attained.

In 1944 there were 70 treatment plants in the Sanitation District. Of these, 50 were given Rating I, 5 Rating II and 15 Rating III. Most of group III were constructed before 1937, were equipped with fine screens and chlorinators, and can not be made to meet the requirements.

Of the 70 plants operating in the district, 42 included plain sedimentation, 12 had Imhoff tanks and 1 a septic tank. Chemical coagulation was employed by 5. There were 5 activated sludge plants, 3 of them in New York City. There was only one trickling filter plant and that a high-rate. One plant included slow sand filters; 2, rapid sand filters and 2 mechanical filters. Four of the 5 activated sludge plants had final settling tanks. Fifteen plants employed fine screens, 13 of them without further treatment except chlorination. Chlorination was practiced by 59 plants.

Sludge digestion was included in 31 plants, one of them using the "Clarigester." Ten plants used mechanical sludge filters. Of the 43 plants operating sludge beds, 34 had covered ones.

Some Operating Details

The Commission's engineers investigated the operation as well as the construction of most of the plants in its district, and several features reported on are of general interest.

One of these was the prevalence of infiltration into sewers and its effect on efficiency of treatment. Some of the comments were: "An extremely light sewage, due to groundwater infiltration, was encountered and

the required removal of suspended solids was not attained." "The sewage flow is highly diluted. Up to the present, the plant has consistently failed in meeting compact requirements." "The amount of ground water infiltration appeared so great that the plant failed to afford effective treatment in respect to compact requirements." "Ground water infiltration on several occasions has been found to affect adversely the finds of our investigations." The above and several other similar comments all refer to separate plants.

At one plant where the sewage was pumped, the capacity of the pumps was too great and they were operated only a part of each day, resulting in peak loads on the plant, which reduced its efficiency. Pumps of smaller capacity have been substituted.

Concerning screening, the report says: "The screening process is of course ineffective in securing the 60% suspended solids removal required for Class A areas."

A bio-filtration plant which had been operating very satisfactorily in 1943 had fallen off greatly in efficiency early in 1944 because of change in personnel, but "after a trained operator had been secured the operation of the plant had returned to normal."

"A large accumulation of field and analytical data, from investigations made at a large number of plants employing primary sedimentation and post chlorination solely, were studied. From these data it would appear that the maintenance of 0.6 p.p.m. residual is adequate to secure a maximum count of 30 coliform organisms per 100 ml., which is within compact requirements."

Sewer Charges in St. Paul

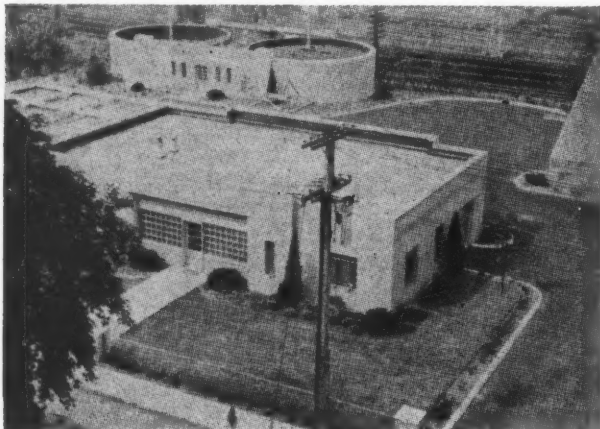
In St. Paul, Minnesota, the Water Department acts as the billing and collection agency for sewer rental charges as established by the City Council each year. These charges are designed to meet the budget as submitted to the Council by the Sanitary District. Sewer rental charges are based on the size of the water meter. Charges for service outside the city are higher than inside the city to cover the city's capital investment. Private wells are metered for the purpose of measuring volume and the basis of sewer rental charges. By agreement, the City of West St. Paul pays, in addition to the sewer rental charges, an annual fixed charge of \$2 per consumer connected to the sewer system.

The sewer rental charges are as follows:

Size of Water Meter	Inside City	Outside City
5/8"	\$0.39 per quarter	\$1.20
3/4"	0.40 per quarter	1.50
1"	0.60 per quarter	2.50
1 1/4"	0.30 per month	1.50
1 1/2"	0.70 per month	2.50
2"	2.00 per month	5.00
3"	6.25 per month	12.50
4"	15.00 per month	30.00
6"	30.00 per month	60.00
8"	52.50 per month	105.00
10"	75.00 per month	150.00
12"	112.50 per month	225.00

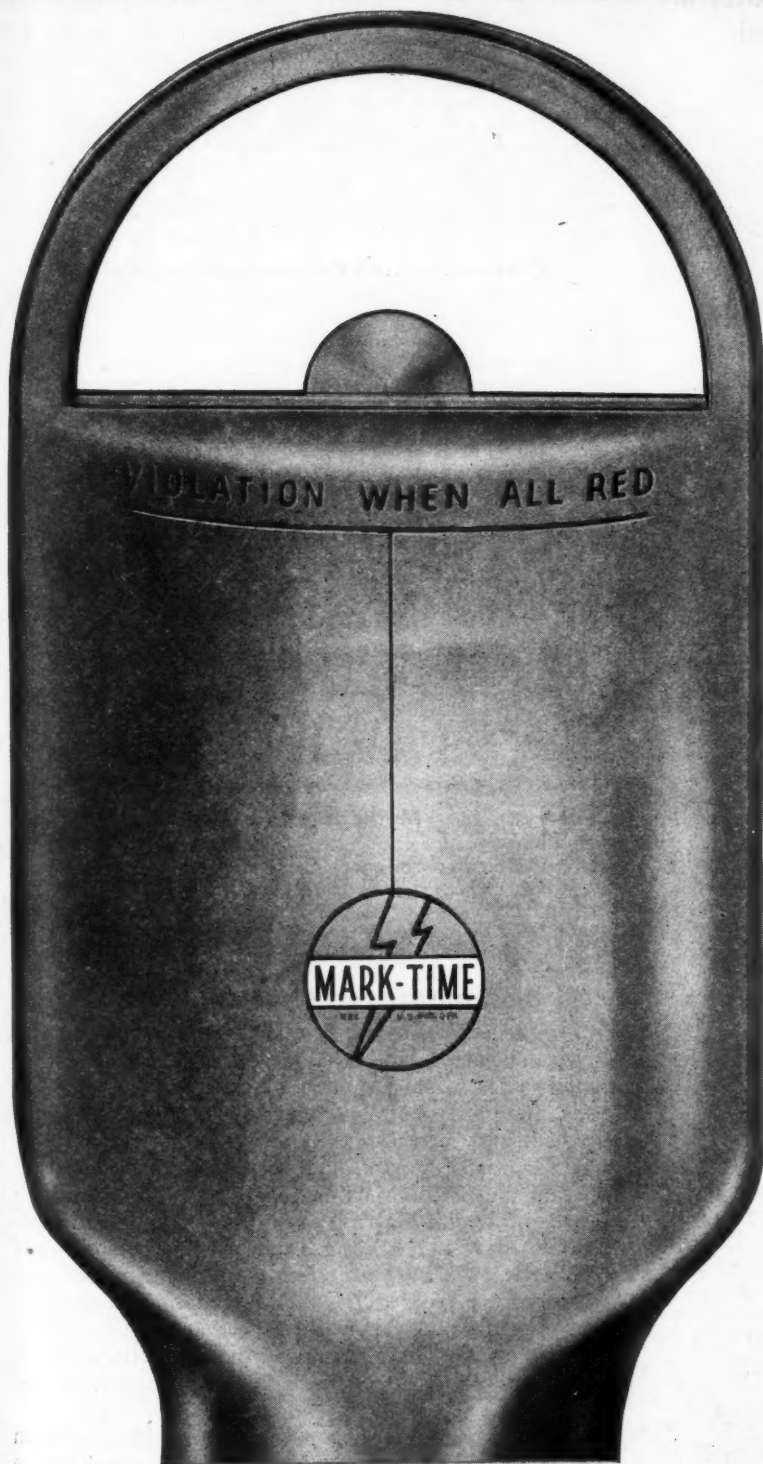
Water Company Bequeathed to Town

The owner of the water company serving Port Allegany, Pa., bequeathed the company to the town in his will, stipulating that the town pay \$1,000 a year to a specified cemetery association and \$500 to the public library. Population of the town, 2,350.



Treatment plant at Ossining, N. Y.

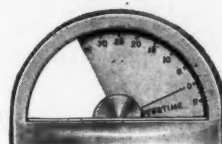
SELECTING THE CORRECT PARKING METER



A GLANCE
TELLS THE
WHOLE
STORY

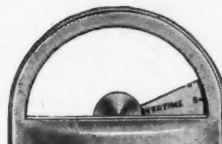


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• SIMPLE



OVERTIME

• RUGGED



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Preformed Expansion Joints for Concrete Pavements

The latest specifications of the A.S.T.M., including bituminous fiber material.

IN JULY of this year the American Society for Testing Materials published a set of the standard specifications for concrete adopted by it, including the latest tentative revisions. Among these is a set of specifications for preformed expansion joints prepared by Committee D-4 on Road and Paving Materials as "tentatively revised" in 1944 and including bituminous fiber, which was not included in the specifications as adopted in 1941. These revised specifications are given below.

Scope

1. These specifications cover preformed expansion joint fillers of the following five types for use in concrete construction. The type or types desired shall be specified by the purchaser.

- Type I, cork,
- Type II, self-expanding cork,
- Type III, sponge rubber,
- Type IV, cork rubber, and
- Type V, bituminous fiber.

Manufacture

2. (a) *Cork and Self-Expanding Cork*.—These types shall consist of preformed strips which have been formed from clean granulated cork particles securely bound together by a synthetic resin of an insoluble nature. The granulated cork shall be relatively free from hard particles or dust and shall not have been exposed in the process of manufacture to a temperature exceeding 300 F. (149 C.).

(b) *Sponge Rubber*.—This type shall consist of preformed strips composed essentially of a durable, elastic rubber compound which may be reinforced on each side with a layer of asphalt treated felt which has been bonded to the rubber compound filler under heat and pressure.

(c) *Cork Rubber*.—This type shall consist of preformed strips which have been formed from clean granulated cork particles securely bound together by a durable elastic rubber compound. The granulated cork shall be relatively free from hard particles or dust and shall not have been exposed in the process of manufacture to a temperature exceeding 300 F. (149 C.).

(d) *Bituminous Fiber*. This type shall consist of preformed strips which have been formed from cane or other suitable fibers of a cellular nature, securely bound together and uniformly impregnated with a suitable bituminous binder.

Character of Strips

3. Preformed strips of expansion joint fillers shall be of such character as not to be deformed or broken by twisting, bending, or other ordinary handling when exposed to atmospheric conditions. Pieces of the joint filler which have been damaged shall be rejected.

Properties

4. (a) *Recovery*.—The test specimen shall be given three applications of a load sufficient to compress the material to 50 per cent of its thickness before test. The load shall be immediately released after each application. At the end of one hour after the third application, the joint shall have recovered to at least 90 per cent of its thickness before the test for types I, II, III and IV, and to at least 70 per cent of its thickness before test for type V.

(b) *Compression*.—The load required to compress the test specimen to 50 per cent of its thickness before test shall not be less than 100 nor more than 750 psi. For bituminous fiber joint filler (type V) the material after compression shall not show a loss of more than 3 per cent of its original weight.

(c) *Extrusion*.—The test specimen shall be compressed to 50 per cent of its thickness before test with three of the edges restrained. The amount of extrusion of the free edge shall not exceed 0.25 in.

(d) *Expansion*.—In the case of self-expanding cork (type II) expansion joint filler only, the test specimen after being immersed in boiling water for 1 hr. shall have a final thickness not less than 140 per cent of the thickness before test. Discoloration of the water shall not be considered an indication of failure.

(e) *Boiling in Hydrochloric Acid*.—In the case of cork and self-expanding cork (types I and II) expansion joint fillers only,

the test specimen when boiled for 1 hr. in hydrochloric acid (sp. gr. 1.19) shall show no evidence of disintegration. Discoloration or a small amount of swelling shall not be considered as failure.

(f) *Weathering Test*.—A weathering test may be conducted in accordance with the procedure specified in Section 8. Test specimens shall show no evidence of disintegration when subjected to the specified weathering test.

Delamination or separation of the fiber structure in type V shall be considered disintegration. Test specimens which have been subjected to the weathering test may be required to meet the requirements for recovery, compression, and extrusion specified in Paragraphs (a), (b), and (c).

(g) *Penetration of recovered bitumen*. The penetration at 25° C of the bitumen recovered from the bituminous joint filler (type V) shall be between 25 and 100.

(h) *Bitumen Content*. The bitumen content of the bituminous fiber filler (type V) shall be at least 35 per cent by weight.

Dimensions and Permissible Variations

5. The preformed strips shall conform to the dimensions specified or shown on the plans. Strips of the joint filler which do not conform to the specified dimensions, within the permissible variations of plus 1/16 in. in thickness, plus or minus 1/8 in. in depth, and plus or minus 1/4 in. in length shall be rejected.

Packing

6. Self-expanding cork shall be wrapped in waterproof paper, sealed in a manner that will prevent the entrance of moisture, and packed at the plant in sizes convenient for handling on the job.

Sampling

7. (a) *Size of Samples*.—Each sample shall consist of sufficient material to provide at least 5 test specimens measuring 4 1/2 by 4 1/2 in.

(b) *Number of Samples*.—One representative sample shall be selected from each shipment of 1000 sq. ft. or fraction thereof of each thickness ordered.

(c) Samples shall be packed for transportation in such a manner that there will be no danger of distortion or breakage. Samples of self-expanding cork, in addition to the above, shall be kept dry as received and wrapped for transportation in a manner that will prevent the entrance of moisture.

Methods of Testing

8. The properties enumerated in these specifications shall be determined in accordance with the Standard Methods of Testing Preformed Expansion Joint Fillers for Concrete, A.S.T.M. Designation: D 545) of the American Society for Testing Materials. (1944 Book of A.S.T.M. Standards, Part II.)

Contract for Removing Rock

The general contract for the erection of a building for the owner provided that: "In excavating if rock be found which would require removal by blasting" \$1.10 per cubic yard should be paid on the architect's measurement and certificate. Claim was made for excavating 820 yards of rock. The rock was not removed by blasting but with a jack-hammer, used, the contractor testified, because blasting might have resulted in damage to adjacent buildings and nearby persons. The contractor, who was apparently an independent contractor, thus avoided possible tort liabilities to third persons. The question in the case was whether, whatever his motive, having removed the rock without blasting, he could recover the extra compensation as per the contract.

The jackhammer process was more expensive than blasting. The contractor claimed that the quoted phrase described the kind of rock to be removed and not the method of removal, so that he could use any method for removing it and still secure extra compensation. His claim was for \$902 for excavating the 820 cubic yards of rock, calculated at the contract rate. The Pennsylvania Superior Court, however, held that, since the popular and ordinary meaning of blasting is the rending or disintegration of rock or other substance by dynamite or other explosive, and that was contracted for and not performed, the plaintiff could not recover. *Scarlot v. Griffith*, 152 Pa. Super. 233, 31 A, 2d 555.

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YOU can't fight a fire with a frozen bucket of water. Nor can you fight icy highways with a frozen stockpile of abrasives.

Extensive preparations for the winter season just ahead are effectively nullified unless the abrasives you stockpile now are protected *now* by freezeproof calcium chloride treatment.

The few dollars you invest for stockpile treatment will actually save hundreds when your ice control operations get underway. Less men and equipment will be needed for loading of trucks. Valuable time will be saved. And the treated grits will go farther, do a much more effective skidproofing job.

Calcium chloride treatment gives maximum protection under any conditions for, as the Committee on Safe Highways of the American Road Builders' Association has reported, "the value of the chemical treatment lies in the anti-freeze properties of its solutions. Calcium chloride may provide protection against freezing at any temperature down to minus 58 degrees F."

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The Drainage of Airports

The need or justification of sub-surface drainage. Necessity and methods of surface drainage. Turfed and paved surfaces.

THE subject of the "Drainage of Airports" is discussed by W. W. Horner in a University of Illinois Engineering Experiment Station Circular, No. 49. In this Mr. Horner says that there are two objectives of airport drainage: the reduction in soil moisture of the upper soil horizon in the interest of increased bearing power; and the removal of surface runoff, during and shortly after periods of precipitation, to the extent necessary to permit landing and take-off safely.

The need or justification of sub-surface drainage has been controversial. Several years ago such drainage was commonly installed because the systems were modeled on agricultural drainage practice. The principal detrimental effect of such installations was the concurrent assumption that they rendered a surface water drainage system unnecessary. This idea has been changed and a positive surface drainage system is considered a necessity today.

Soils which become unstable when wet generally have low infiltration capacities and low water transmission capacities and consequently a sub-surface drainage system in such soils would not be very effective. On the other hand, coarse-grained soils have a high percolation capacity and water percolates to the water table rapidly and under-drains would add little to the picture. On runway fields handling heavy planes, sub-drainage lines along the edges of the runways may occasionally be justified to reduce lateral transmission of water under the runway. The all-over type of field is used chiefly only for training, and high moisture contents for short periods of time are not sufficiently serious to justify large expenditures for sub-drainage.

In a majority of cases a strong turf will have sufficient transpiration losses to remove excess moisture from the topsoil. Thus it is extremely rare where sub-drainage is employed on more than a small portion of an airfield.

Horner cites some interesting experiences in the consideration of sub-drainage systems for the Washington National Airport and the Idlewild Airport in New York.

As a criteria for surface drainage, it is the present consensus that field operation of civil airports will be satisfactory provided that standing water does not encroach on the runway pavement oftener than once in 2 or 3 years and also not on the central 100 ft. width of runways oftener than once in about 10 years. These considerations may be summarized in the requirement that the water shall not be permitted to stand within 50 ft. of the runways more than once in two years on the average. The first step in the development of the drainage system is the location of the surface inlets, the provision of an adequate inlet capacity, and the laying out of the drainage network.

Continuous porous rock fill along the edge of runways have not functioned satisfactorily in many instances. Today airport drainage almost invariably involves the construction of positive inlet gratings at definite intervals.

The so-called "Rational Method" of storm sewer de-

sign is hardly adequate for airfield drainage design but has been used in many instances for lack of anything better. Horner presents examples to show the complexities involved in the factor "c" of the formula, $Q = cIA$.

Surface drainage design has been aided by new information on the infiltration capacity of soils and new conceptions of the hydraulics of overland flow. Permission to store water in wide gutters adjacent to the runways, and even partly up the crown of the runways, reduces tremendously the cost of the pipe system required to carry the water away, as compared to that required when rapid removal without any storage is deemed necessary.

Horner discusses the design at Lambert Field, St. Louis; at the Washington National Airport, and at the Idlewild Airport. Such items as the rate reducing effect on runoff of surface detention on turfed and paved surfaces and the effect of inlet spacings or gutter lengths on reducing runoff rates are considered.

At Washington the runoff is carried through wide turfed gutters of flat slopes, giving a high rate-reducing effect. The design at Idlewild was concerned with flow over paved surfaces only and consequently involved high rates of runoff. A system was devised of making inflow hydrographs for each inlet and adding the ordinates of these hydrographs, offset according to the time of flow, to obtain the flow at any point in the system.

Chlorination Removes Pipe Line Growths

Little Rock, Ark., obtains its water supply from 1240-acre Lake Winona, from which it flows to the city through 33 miles of 36-inch pipe laid with rubber gasket joints. In his report for the year 1944, L. A. Jackson, manager-engineer, said:

"The application of break-point chlorination to eliminate and control organic growth in the pipe line and to re-establish the designed carrying capacity of the line was continued throughout the year. Two carrying capacity tests were performed during the year on February 4th and July 7th, with both tests showing over-all satisfactory performance registering flow rates of approximately 23.5 million gallons per day.

"The chemical treatment adopted to improve this line has practically re-established its carrying capacity and future organic growth can be controlled. Some refuse still clings to the inner surface of the pipe, and the removal of this by some mechanical means may be necessary to completely restore the 25 million gallons per day carrying capacity of the line.

"The pipe line was patrolled weekly and thoroughly flushed three times during the year. To prevent possible damage to the control valve, the point of chlorine application was changed from the valve house to the first valve box, approximately 125 feet distant. Maintenance of the 33-mile pipe line and valve structures on the line followed a normal course."

Texas Board of Water Engineers

The Texas Board of Water Engineers has had its biennial income increased from \$150,920 to \$235,490 for the two years beginning Sept. 1, and is planning a thorough investigation of the surface water resources of the state, to aid in the solution of water shortage problems which confront a number of Texas cities.

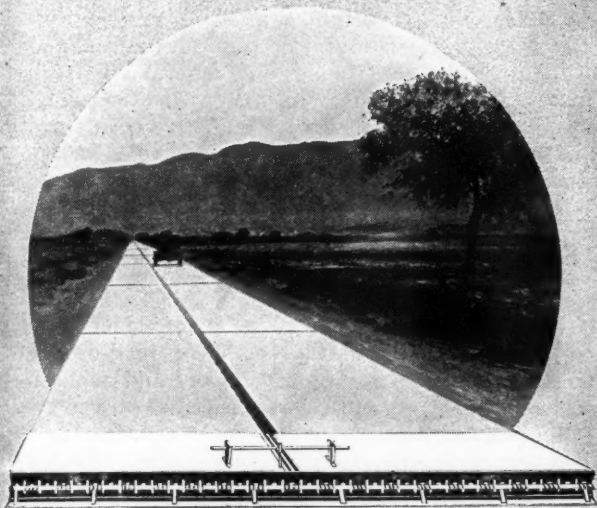
There's no Disagreement on

Road Joints!

In the 20s and 30s when concrete road building was getting its start, it was logical for highway engineers to resist the use of metal road joints. These joints were costly and new. Their use would cut down the total miles of hard road that could be built with the money at hand—and farmers were stuck in the mud!

The objective then was *miles today*. The cost tomorrow in maintenance was a secondary consideration.

In 1934 Federal engineers, realizing the necessity for *crack control* in concrete pavements, issued a bulletin requiring expansion and contraction joints on all new federal-aid highways. The large reduction in maintenance costs on federal-aid roads attests the wisdom of this action.

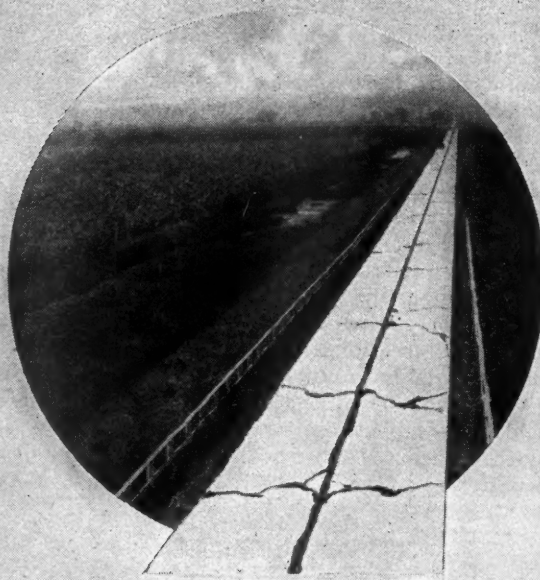


AFTER 10 YEARS—A ROAD WITH
KEYLODE JOINTS LOOKS LIKE THIS

Today there's no disagreement on road joints. Everyone agrees that crack control in concrete pavements by the use of load transferring expansion and contraction joints is an economic necessity. The only unsettled problems involve the spacing, the design and the cost.

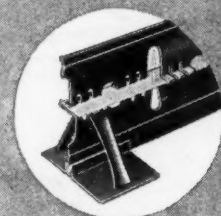
The mass of available data will make it easy for highway engineers to establish a joint spacing standard soon.

Many engineers have already decided that the KEYLODE contraction joint is the design they want—and the cost of KEYLODE joints is so little that you can get **BOTH miles today and crack control tomorrow** for the same money.



AFTER 10 YEARS—A ROAD WITH-
OUT JOINTS LOOKS LIKE THIS

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Procedure in Planning Highways in Texas

Five principles followed in designating routes for the main highway system.

As stated in the January issue of *PUBLIC WORKS*, the 1944 Federal Highway Act provides for the planning and construction of a system of interstate highways connecting the principal metropolitan areas, cities and industrial areas, and a system of the principal secondary and feeder roads. The State highway departments are responsible for initiation of the projects, preparation of plans, letting of contracts and supervision of construction, all subject to the approval of the Public Roads Administration.

The Texas Highway Department, through its Urban Planning Division, has completed the designation of routes through 16 cities of that state, and construction plans are under way for 8 of them. In planning these routes, five principles were followed, described by Jac L. Gubbels, director of urban planning of the Highway Department, as follows:

(1) Avoid traversing a critical zone. (2) Avoid schools and churches. (3) Find a route through the least expensive property to the fringe of the heart of the city. (4) Find the route best adapted to aid in the uniform development of the city by compactness of expansion rather than the "string" development of days past. This in turn fosters the economical installation of utilities and street construction. (5) Aid traffic by showing where traffic wants to go.

The procedure in each city starts with an analysis of information supplied by municipal officials on retail, wholesale, and industrial areas; on residential zones by house and lot valuation; on apartment districts; and on all physical plants such as schools, parks, playgrounds, institutions, and churches. Traffic data are secured either by volume count or by origin and trip destination. Preliminary plans for routes are then prepared and meetings held with planning boards and with city and county officials; a tentative report is given to municipal officials, and further conferences held. The suggestions of local officials are reviewed by the director of urban planning of the state highway department and all information submitted to the state



The recommended interregional system of highways in Texas and vicinity. Each dot represents 2,000 inhabitants.

highway engineer. After the plans are approved a report is printed with copies going to city and county officials and to the Public Roads Administration. In the case of some of the larger cities, such as Beaumont, Dallas, Fort Worth, Houston, and San Antonio, consulting engineers from firms of national reputation are engaged to make an independent report.

When the final report has been approved and published municipal officials meet with the highway department to select projects by number and order of importance, to make a commitment of funds available by the city and the state, and to make a recommendation to the highway commission which in turn makes the final decision. Cities and counties in Texas furnish the necessary right-of-way at no cost to the state, and the state highway department with federal assistance furnishes all engineering supervision and meets all construction costs. In all surveys that have been made so far the present city limits are considered to be the urban area.

Responsibility for Water Meter Boxes and Excavations

If a municipality installs in the public sidewalk a water meter box and in the course of reading the meter the municipality's agent removes and replaces the lid of the box, he must use reasonable care to restore the lid and the municipality must maintain it in a condition safe for the use of pedestrians. Whether such reasonable care has been exercised is usually a jury question. The tilting of a box lid which has been left unlocked, and the alleged immovability of an unlocked lid when in position, may also be for the jury. (*Fay v. City of Trenton*, New Jersey Court of Errors and Appeals, 126 N. J. L. 62, 18 A. 2d 66.)

In an action against a water company for personal injuries received when plaintiff stepped on the loose cap of a water meter vault or well maintained by the company, the Kentucky Court of Appeals held (*Walters v. Louisville Water Co.*, 206 Ky. 511, 177 S. W. 2d 889) that the testimony of a witness that several days before the injury she had called the office of the water company and notified a woman who answered the telephone and a man to whom the call was referred, that the meter shaft was unlocked was admissible although the witness could not identify the persons with whom she talked. The probative force of this testimony was for the jury. See also *Louisville Water Co. v. Lutz*, 296 Ky. 432, 177 S. W. 2d 570.

When, in broad daylight, one walks into an obvious and exposed defect in a sidewalk, such as, in this case, an imperfectly filled-in excavation ranging from two to four inches deep left by a water company, a presumption of contributory negligence arises, and the plaintiff must show conditions outside himself which prevented him from seeing the defect, or which would excuse his failure to notice it. If the user of a public sidewalk fails to notice an obvious danger he is negligent as a matter of law. (*D' Annunzio v. Philadelphia Suburban Water Co.* Pennsylvania Superior Court, 18 A. 2d 86.)

Sewer Rentals in Virginia

The Virginia cities of Fredericksburg, Radford, Richmond, Williamsburg, and Winchester, are financing the construction or operation of their sewerage systems through the collection of service charges. Sewer rentals are imposed on users outside the corporate limits in four other Virginia municipalities.

TEN REQUIREMENTS FOR UNDERGROUND MAINS *under normal conditions*

Long Life: In evaluating bids, the useful life of cast iron pipe is figured at 100 years minimum.

Carrying Capacity: The carrying capacity of standard tar-coated cast iron pipe remains practically unimpaired for centuries. For the certain areas where tuberculating water is encountered, cement-lined cast iron pipe is available. Under such conditions, no other material offers the combined long life and sustained carrying capacity of cement-lined cast iron pipe.

Tight Joints: For ordinary pressures, cast iron bell-and-spigot pipe—for high pressures, cast iron mechanical joint pipe—are known to be leak-proof.

Tensile Strength: When tested under hydrostatic pressure to destruction, the ultimate tensile strength of cast iron pipe is a minimum of 11,000 p.s.i. for pit cast pipe and a minimum of 18,000 p.s.i. for cast iron pipe made by other methods.

Beam Strength: Under beam stress tests, 10 ft. span, standard 6" cast iron pipe sustains a load of 15,000 pounds and bends approximately one inch before breaking.

Toughness: Under hydrostatic pressure and the impact of a 50 lb. hammer, standard 6" cast iron pipe does not crack until the hammer is dropped four feet.

Internal Pressure: An average of many internal hydrostatic pressure tests on standard 6" cast iron pipe shows this pipe withstands more than 2500 pounds pressure per square inch.

External Load: In regulation ring compression tests, standard 6" cast iron pipe withstands a crushing weight of more than 14,000 lbs. per foot.

Imperviousness: The walls of cast iron pipe are impervious to leakage, seepage, or sweating of water, gas or chemicals under internal pressure tests.

Tapping: Cast iron pipe can be tapped cleanly with strong, tough threads, losing little in structural strength.

Other pipe materials meet some of these requirements but only cast iron pipe meets them all.



Whether a pipe material is able to fulfill these requirements is a matter of experience rather than prediction. A page of history is worth a volume of sales claims. History proves that cast iron pipe has been meeting these ten requirements for generations.

Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, Peoples Gas Building, Chicago 3.

CAST IRON PIPE

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Designing Settling Tanks

(Continued from page 17)

The drive may be either a motorized reducer or motor and separate reducer. The motor should be of the splash-proof type; the reducer should have either helical or herringbone gears, with anti-friction bearings.

In the smaller installations the sludge is scraped into hoppers at the influent end. Sludge is apt to be retained on the sides of the hoppers, even if they are very steep, and it is advisable to install spray pipes on the sides of each hopper for flushing down all adhering material.

Sludge is withdrawn from the hopper as follows: Each hopper is connected to a sump by means of a pipe provided with a gate. This gate is opened, and as the sludge flows into the sump it is observed and as soon as it thins, the gate to a second hopper is opened. The first one then is closed and the spray for washing down its sides is turned on for 1 or 2 minutes. When the gate from the second hopper is closed, that from the first hopper is opened again and the rest of the sludge is withdrawn. (It requires a head of about 4 ft. to start the sludge flowing). From the sump the sludge is pumped to the digestion tank. Provision should be made for pumping the sludge directly from the hoppers to the digestion tanks.

Large tanks having two or more collectors often are provided with a cross collector which discharges into a small hopper. Such an arrangement simplifies the operation as there is only one point from which sludge is withdrawn, sprays are not needed, and the sludge is pumped direct to the digesters. A sampling station in the pumping line should be provided.

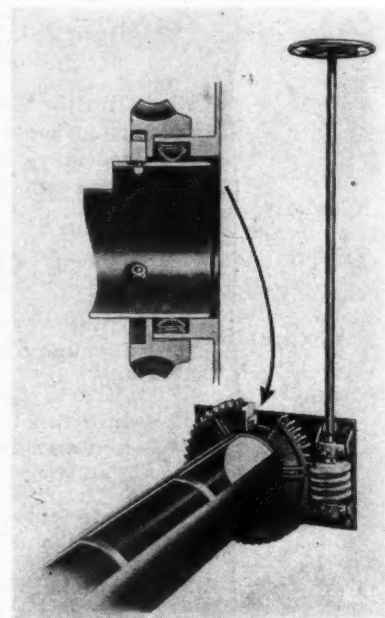
Scum usually accumulates on the surface of a settling tank, consisting of grease and oil, either separate or attached to solids. In most plants this floating material is collected and concentrated at the effluent end by the same mechanism that collects the sludge. Where, as is the case in many tanks, scum accumulates at the influent end, this scum is not removed by the collector but can be forced within reach of it by a spray turned on for a few minutes every day.

The floor of the tank is usually sloped toward the

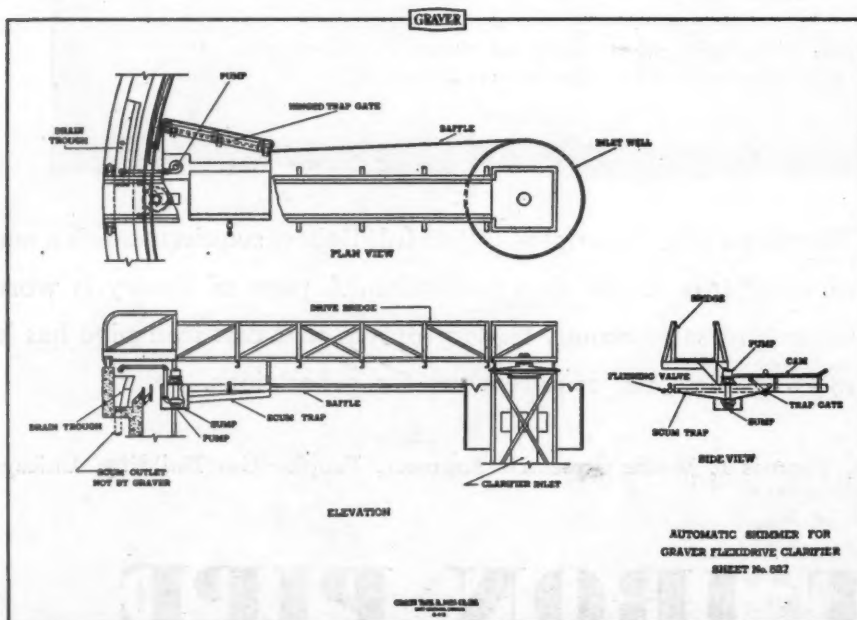
influent end with a drop of 6" to 12". This does not assist the removal of the sludge but does facilitate the drainage of the tank.

The flights, as they move down the tank, slide on 25-lb. rails set in the concrete floor. They may be set and bolted in place when setting the forms before pouring the floor concrete, or slots may be left in the concrete so the rails can be grouted in later. In the former case they are used as guides for the screed and so secure a true surface of the floor, assuring a uniformly close contact of the flights with it.

The effluent end of the tank contains means for removing the scum and the overflow weir with a baffle in front of it. The simplest method of removing scum is through a trough spanning the tank and provided with an apron; into which the scum is scraped by hand. It is rather difficult to remove floating oil by this method. A device for removing both scum and oil consists of a slotted pipe set across the tank at the level of the water surface, which can be revolved so that the scum can flow through the slot into the pipe, then revolved back until the slot is out of the water. This removes a considerable volume of sewage also and a decanting tank for separating it from the scum and oil is necessary. Several types of automatic collectors are available, either actuated by the sludge collector or driven by a separate motor, but it is



Revolving sludge skimming pipe.



Automatic skimmer for Graver "Flexidrive" clarifier.

questionable if the first cost and cost of maintenance justify their installation.

For most large plants, scum-collecting equipment is advisable. There are several types available, all of which travel across the tank, some using a single flight and others multiple flights. The latter type is similar in construction to the sludge collector, the flights traveling across the tank and up a slight incline and discharge the scum into a hopper. These work well on scum; not so well on oil, but should do so with slight alterations. Both the Cleveland and Chicago types of single-flight skimmer remove scum and oil equally well, floating the material rather than scraping it into the hopper. In the Chicago type,

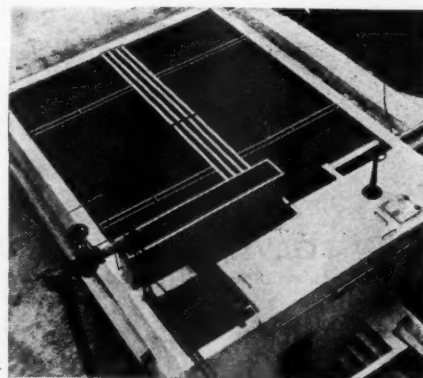
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the flight pushes the scum toward a bucket at the side of the tank, which bucket is tilted, as the flight nears it, so that the front edge is submerged and the scum can float into it; returning to its former position as the flight is withdrawn.

Where scum is removed manually, the effluent weir is placed at the end wall of the tank, extending across its entire width. It must be adjustable so that the weirs of all tanks can be brought to the same elevation, and level throughout their entire length. In tanks supplied with skimmers, the difference in water level between minimum and maximum flows must be held to a minimum by providing sufficient length of weir to effect this, for which purpose additional effluent weirs and troughs are placed across or longitudinal to the tank. This also reduces the velocity of flow over and of approach to the weir, thus tending to reduce the amount of suspended matter removed in the effluent. Weirs are usually made of steel, hot galvanized after fabrication.

Where the weir is set in the end of the tank, a baffle extending 3 to 4 ft. below the surface is set just ahead of it. This serves the dual purpose of distributing the flow uniformly along the full length of the weir and of stopping floating material from going over it. In many cases this baffle and a scum trough are combined in one concrete structure.

Round Tanks

In most round tanks the influent is brought in through a pipe that passes under the floor of the tank to the center, where it rises vertically and discharges several feet below the surface. In some cases, however, it is brought in across the tank at approximately mid-depth, discharging upward at the center through an elbow. The velocity of flow of the sewage as it leaves the pipe is necessarily high—often 2 or 3 fps—and not uniformly distributed over the outlet area. This velocity has to be practically killed and the flow directed from the center of the tank to the effluent weir which occupies the entire circumference. One method is to discharge the flow through comparatively small openings in the vertical pipe, reverse it by a short circular baffle surrounding the pipe (thus using up the energy of the velocity), and then distribute it by passing it through numerous openings in another concentric baffle of larger diameter. Another method is to discharge the influent below the surface without baffling to change the direction of flow, and distribute it by means of a baffle of large diameter.

Three types of sludge removal mechanism are furnished by manufacturers—the spiral, the multiple scraper and the traveling conveyor. The first two have a central drive; the traveling conveyor type has a circumferential drive. Each of these moves the sludge slowly along the bottom of the tank to the center of the tank; the spiral by means of a blade that spirals from the center to the circumference; the multiple-scraper by a number of short scrapers distributed from the center to the circumference, set at an angle with the radius, and attached to radial arms; the traveling conveyor by flights on an endless chain which travel radially toward the center, the whole traveler meantime revolving slowly around the tank.

The diameter of a circular tank is determined by the capacity, detention period and depth. The water depth at the side of the tank is generally between 6 ft. for small tanks and 9 ft. for large ones.

The floors of the tanks have a pitch toward the center of about one inch to the foot, which is provided to float the sludge to the effluent opening at the center

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OMEGA

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The illustration shows a Universal Feeder with lead lined dissolving chamber, stainless steel high speed mixer, and Rotameter on water supply. These accessories are recommended for feeding Ferrisul, Ferrifloc and low grade alum. Included also is a bucket elevator for use where overhead storage is not available. Note low and high level controls on feeder and elevator housings. Dust remover makes hopper charging a completely dustless operation. Complete chemical feeding systems are engineered and built to fit the job.

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OMEGA MACHINE COMPANY

(Division of Builders Iron Foundry)

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of the tank; although the manufacturers of the traveling conveyor claim that it can operate on a level floor. To minimize the agitation of the settled sludge, the speed of revolution at the circumference should not exceed 7 to 10 f.p.m., depending upon the size of the tank and type of equipment.

The sludge is collected in a small hopper below the floor at or near the center of the tank, from which it is withdrawn through a pipe laid under the floor.

The removal of scum is generally automatic and the equipment for it less complicated than in rectangular tanks of equivalent size. The scum is directed to a hopper by a conveyor or plate set at an angle to the direction of travel and revolved around the tank with the sludge removal mechanism.

Final Tanks for Standard Percolating Filters

A standard percolating filter may be defined as one with a capacity of 2 to 3 mgad and intermittent operation. Practically all new installations have rotary distributors. (Note: Of 22 standard filters built in 1943, only 3 installed fixed nozzles. See PUBLIC WORKS for July.)

It has been common practice to design the final settling tank for such an installation with a detention period of 1 to 1½ hrs., based on the average flow. The sludge in the filter effluent settles rapidly; but as the operation is intermittent, the rates of flow of the filter effluent reach maximums much higher than the average, often three or four times as great. The flow to the final tank can be made more uniform by placing a regulating gate between the filter and the tank, thus causing the underdrains of the filter to serve as storage basins. Even with this, a 2-hour detention period is advisable.

Distribution between the tanks and across the tanks is as important as in primary tanks. The construction and equipment are the same except that skimming equipment is not required. In rectangular tanks a baffle dipping a few inches below the surface to kill the surface velocity is desirable.

Final Tanks for High-Rate Filters

There are several types of high-rate filters—the Bio-Filter, Aero-Filter and Accelo-Filter; but they all have this in common, that the higher the rate of application, the finer the sludge and the more difficult to settle. The detention period should be 2 to 2½ hrs., careful distribution is essential, and slow speed of the sludge collecting machinery. The equipment is the same as for primary tanks except for the omission of provision for collecting scum. Rectangular tanks should not be more than 120 ft. long, keeping the velocities of flow lower than in primary tanks.

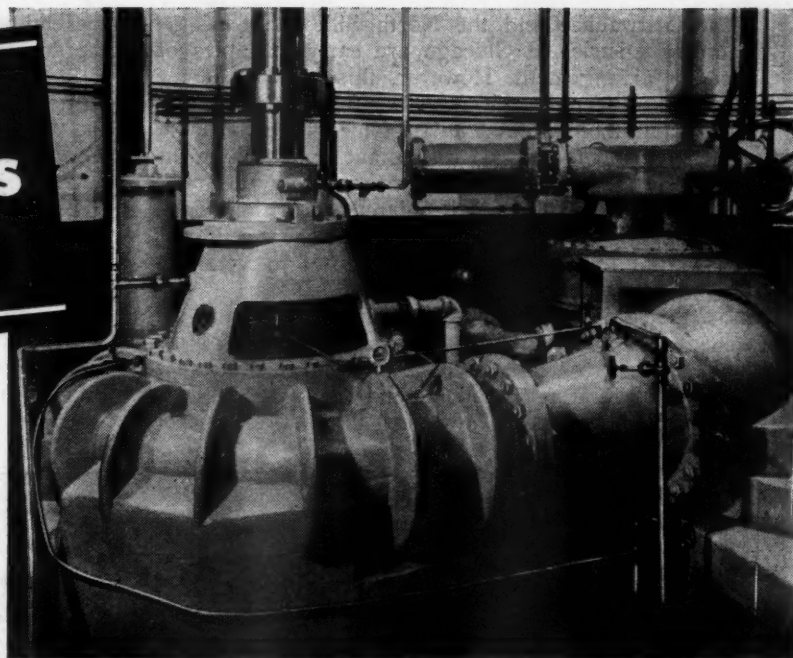
Final Tanks for Activated Sludge

The settling characteristics of activated sludge are quite different from those of other sludges. The finely divided floc of the aeration tank coagulates when it reaches the final tank and the large particles settle out in a very short period of time. The real problem is to effect the settling of the remaining fine particles, as the effluent should not contain more than 20 ppm suspended solids. Velocity of flow through the tank and speed of collector mechanism must therefore be lower than in primary tanks; in rectangular tanks the weirs must be longer and differently located in the tank.

It was observed in the earliest plants that the clearest liquor was not at the effluent end but somewhere near the center of the tank and it seemed that the logical plan was to place the effluent channel at that

GRAND RAPIDS GETS ITS MONEY'S WORTH

REPEATED SPECIFICATION OF WORTHINGTON EQUIPMENT DEMONSTRATES COMPLETE SATISFACTION



One of the Worthington single stage high head Volute pumps installed at Grand Haven Station, Grand Rapids

In 1928, the city of Grand Rapids, Michigan, installed in its Market Avenue Station eight Worthington Mix-flo Centrifugal Pumps as follows:

2-20" Vertical	5600 GPM 18' Head	40 HP Motor
2-20" Vertical	8400 GPM 18' Head	50 HP Motor
4-36" Vertical	31,500 GPM 15' Head	200 HP Motor

In 1930, Worthington furnished additional pumping units to the main station:

2-20" Horizontal	15 MGD* 303' Head	1050 HP Steam Turbine
*In series. In parallel: 24 MGD at 188' Head		

Then, in 1939, a new source of supply was needed, and Worthington equipment as follows went into the Grand Haven Station:

1-18" Vertical	*14 MGD 220' Head	700 HP Syn. Motor
1-18" Vertical	*17 MGD 235' Head	900 HP Syn. Motor
1-20" Vertical	*21 MGD 255' Head	1200 HP Syn. Motor
1-24" Vertical	*25 MGD 280' Head	1500 HP Syn. Motor
1-30" Vertical	*31 MGD 325' Head	2200 HP Syn. Motor
*All these are single-stage high head volute pumps		

And, at the same time, into a fourth station went:

1-18" Horizontal	14 MGD 200' Head	600 HP Syn. Motor
1-20" Horizontal	21 MGD 210' Head	900 HP Syn. Motor
1-20" Horizontal	25 MGD 225' Head	1200 HP Syn. Motor
1-20" Horizontal	31 MGD 235' Head	1500 HP Syn. Motor

Obviously, Worthington Pumps have been successful in the city of Grand Rapids.

The reasons the city of Grand Rapids and so many manufacturers select Worthington equipment are, chiefly, Worthington's complete line and its top-flight engineering specialists. An idea of the range of equipment from water meters to Diesel engines is given in the strip of products at the left. Worthington engineers—members of a world-wide staff—will help you select the equipment that will prove to you *there's more worth in Worthington. Worthington Pump and Machinery Corporation, Harrison, N. J.*

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*The complete line . . .
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WORTHINGTON



point. Milwaukee and the North Side plant of the Sanitary District of Chicago are early examples of such an arrangement. However, this location of the channels or troughs did not give the required flexibility, and the Sanitary District made a number of experiments at the Des Plaines plant to determine the best design; and when this plant was shut down the investigation was continued under the direction of the writer at the Springfield, Ill., plant. The result was the H trough now almost universally used in rectangular tanks.

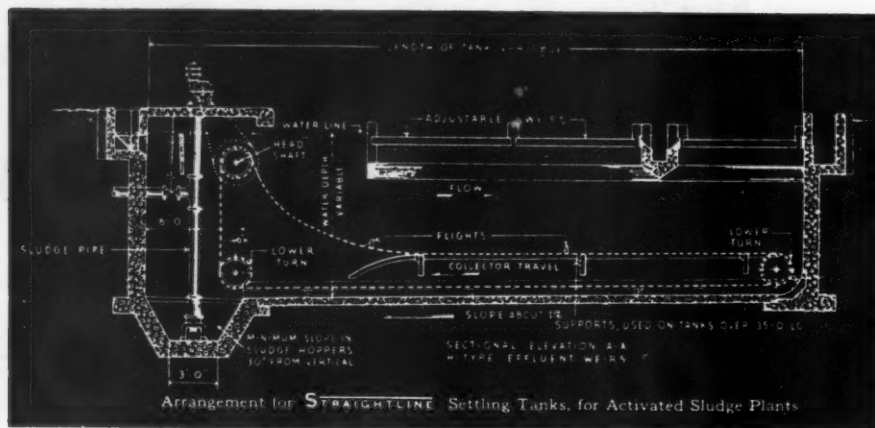
In this design, longitudinal weirs extend from the effluent end for about two-thirds of the length of the tank, and a cross trough connects them at a distance of about 20 ft. from the effluent end of the tank. Under no circumstances should any part of the flow go over

the end wall. All weirs should be adjustable so that the flow may be taken off wherever it is clearest.

Round tanks have long circumferential weirs, but even in these the efficiency may be increased by moving the effluent trough towards the center of the tank. Such construction is rather costly and the increased efficiency may not justify the added expense in the majority of cases.

The design of the influent channels and means for distributing the flow in the tanks is about the same as for the primary tanks. As air under pressure is available, aerated channels are advisable and have the additional advantage of mixing the return sludge with the settled sewage. The installation and maintenance of diffuser plates or tubes is quite a problem, especially in narrow channels. Several plants use perforated copper

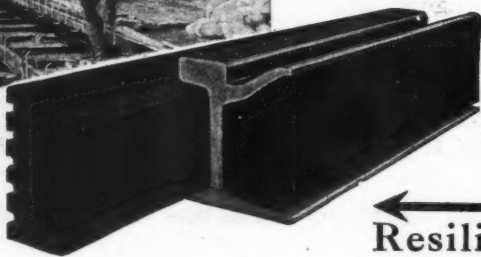
pipes with good results; one New Jersey plant has had them in operation for 11 years, with one cleaning during this period. The $3/32$ " holes are spaced on 4" centers, the burrs on the inside of the pipe caused by the drill being entirely removed to prevent clogging. At the Los Angeles County plant, $1/4$ " holes were drilled in the pipe, and small copper plates with $3/32$ " holes in them were sweated to the pipes. Whenever the holes become too large, the small plates can easily be replaced with new ones.



Settling tank for activated sludge plant installation provided with H-type weirs.



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Lock Joint Pipe Company has applied the principles of prestressing steel in tension and concrete in compression in the design and manufacture of Lock Joint Prestressed Concrete Cylinder Pipe.

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PRESSURE PIPE

The baffle at the influent end of these final tanks should be deeper and the slots for the planks should reach within 2 ft. of the floor of the tank. A shallow baffle should be provided to kill the surface velocity. As a rule, equipment for skimming is not required and scum baffles are omitted.

The capacity of the tank should be sufficient to give a detention period of not less than 2 hr. plus 25% sludge return. The depth of a rectangular tank may be anywhere from 10 to 13 ft.; side depth of round tanks from 8 to 10 ft.

The speed of the longitudinal collectors should not exceed 1 fpm and of the cross collector 2 fpm. The speed of the collectors in round tanks is necessarily higher and therefore a deeper sludge blanket is required.

Sludge may be withdrawn by gravity through an adjustable pipe for each hopper, flowing over the top of the pipe or through V-notches cut in the side; the volume of flow being regulated by raising or lowering the pipe. Many plants use air lifts to remove the sludge, varying the volume by adjusting the amount of air. The average sludge return is 25% of the incoming flow but provision should be made for a minimum of 40%.

Final Tanks for Modified Aeration

Only a few plants are using as yet the modified aeration process, developed by R. H. Gould, Director of Engineering, Dept. of Public Works, New York City. The final tanks for this have the same detention period as for activated sludge. The sludge is heavier than activated sludge and settles more readily. It is withdrawn at the effluent end instead of the influent,

but the weir arrangement is the same as for activated sludge tanks. The speed of the collectors, moving from the influent to the effluent end, is 2 fpm and provision is made for increasing the speed by changing the sprockets. The sludge is withdrawn with a high moisture content—about 2,000 ppm suspended solids; the means for withdrawal being the same as for activated sludge.

Specifications for Tanks and Equipment

Corrosion and wear are especially active in sewage treatment plants, and specifications should be particularly directed toward minimizing them. Neither can be prevented but the life of the plant can be prolonged and maintenance cut down by using materials resistant to corrosion and specifying equipment that will stand up for a number of years. Many patents for sewage equipment will expire during the next few years, newcomers will enter the field and competition will be keen, and detailed specifications will be more desirable than ever.

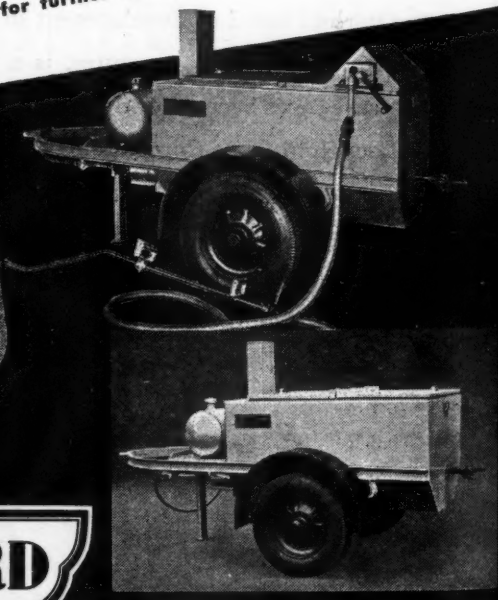
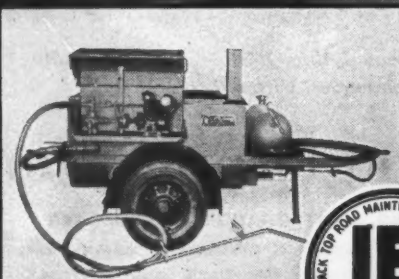
Concrete must be Class A—1½" stones, with about 6" slump, and in the majority of cases it is advisable to give it a coat of bituminous paint, if only above the water line and a foot below. Expansion joints should be placed at from 60'-0" to 70'-0" intervals and each tank should have at least one longitudinal expansion joint.

Weirs usually are steel, hot galvanized after fabrication (state thickness of galvanizing coat). If sherardizing is preferred, either the penetration or the temperature of the chamber and length of exposure should be specified. Steel should conform to standard specifications of A.S.T.M. for building, A-7.

LITTLEFORD 84-HD MAINTENANCE

KETTLE

This Tar and Asphalt Kettle speeds up repair work because it heats faster. For Streets, Roads, and Highway Maintenance, the 84-HD Kettle does the job the modern way. With Hand or Motor Spray Attachment, the 84-HD is a more versatile unit. Ask for Bulletin No. 1 for further details.



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Drawn by Dean Cornwell

U.S. cast iron PIPE

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If you need cast iron pipe now, or later, remember that our pipe foundries do not have to be recon-verted, although current production is somewhat modified by limited manpower—that the combined facilities of our several plants represent the largest production capacity in the cast iron pipe industry—and that we can ship from plants and storage yards strategically located in various parts of the country. In the most commonly used sizes, U. S. cast iron pipe and fittings are readily available.

Many engineers prefer wrought iron and this should meet the specifications of A.S.T.M. : A-7-39.

Nuts must go on bolts without removing the galvanizing coat from either of them.

Where galvanizing or sherardizing is not practicable, the minimum thickness should be given. Many engineers prefer $\frac{3}{8}$ " steel. It should be given a coat of bituminous enamel from $\frac{1}{64}$ " to $\frac{1}{32}$ " thick, to be applied after the equipment is in place. Aluminum has come into use for stop gates and gratings; if used, the alloy recommended by the manufacturers and the method of installation should be specified; electrolytic action must be guarded against.

Motors are as a rule of the splash-proof ventilated type for both indoor and outdoor service; they will not give trouble if a drain hole for the removal of condensation is provided.

Reducers should meet the standards of the A.G.M.A. for continuous service; all bearings should be of the anti-friction type; gears preferably of the helical or herringbone type. Whatever the type, the efficiency of the reducer only should not be less than 60%.

Chain shall be made from processed malleable iron with an ultimate strength of 70,000 lbs. in a standard test bar, and elongation of 10%. Ultimate strength of chain for tanks under 140'-0" long should be 30,000 lbs.; over 140'-0" long, 36,000 lbs.

All sprockets should have plate centers and chilled rims, chills being not less than $\frac{3}{8}$ " deep.

To Enforce Payment of Sewer Charges

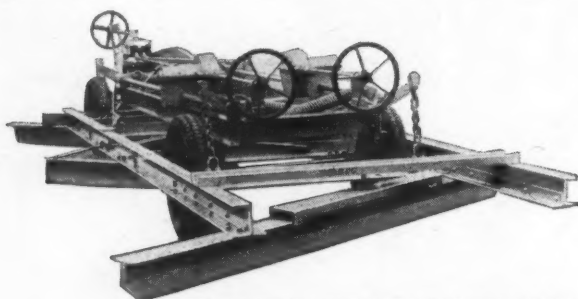
The city commission of Waco, Texas, has passed an ordinance providing for a city sewer tax, the funds from which can be used to finance operation, main-

tenance and extension of the municipal sewer system; any surplus from this to be applied to principal, interest and service charges on the sanitary sewer bonds. Citizens who refuse to pay this tax will have their service cut off by the city's filling their service pipes with concrete; service to be restored only after payment of all expenses incurred in connection therewith in addition to the tax owed.

"Lowest Responsible Bidder" on Sewer Construction

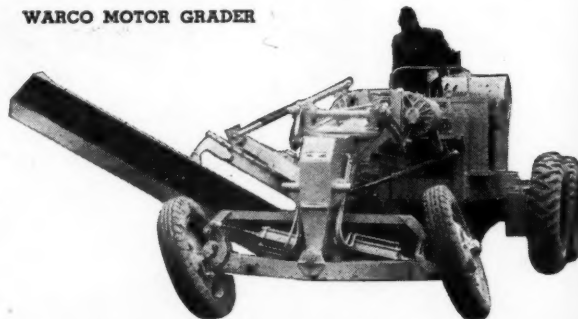
Denying a motion to enjoin the defendant city from disqualifying the plaintiff partnership as bidders for the construction of a municipal sewer and to award the contract to others although plaintiffs were the lowest bidders, the New York Supreme Court (Picone v. City of New York, 176 Misc. 967, 29 N. Y. S. 2d 539) held that, "under the provisions of section 343 of the New York City Charter the award of contracts on public letting must be made to the 'lowest responsible bidder.' That term does not mean one who is only pecuniarily responsible. It implies skill, judgment and integrity as well as sufficient financial resources."

It was also held that: "The courts have no right to sit in judgment upon questions of administrative discretion, or interfere with the conduct of municipal officials in the absence of illegality, fraud, collusion, corruption or bad faith." The court must therefore assume, in the absence of contrary showing, that the discretion of the official who awarded the contract was exercised with an honest desire to award the contract to the lowest responsible bidder and therefore was not subject to review by the courts.



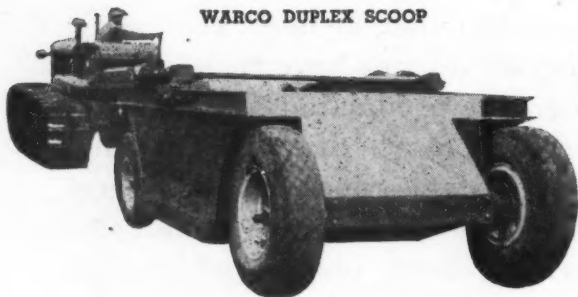
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WARCO DUPLEX SCOOP



Out on that construction job - or where they're working like beavers on road making and maintaining it's results that count! Watch the Warco team* chalk up an impressive score in terms of earth moved at minimum cost. It's a team you can bank on - one that will bank money for you!

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*The team - Grader, Maintainer, Scoop, Terracer.



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Osgood

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9-Year-Old Osgood Shovel Brings Top Price in Surplus Equipment Sale

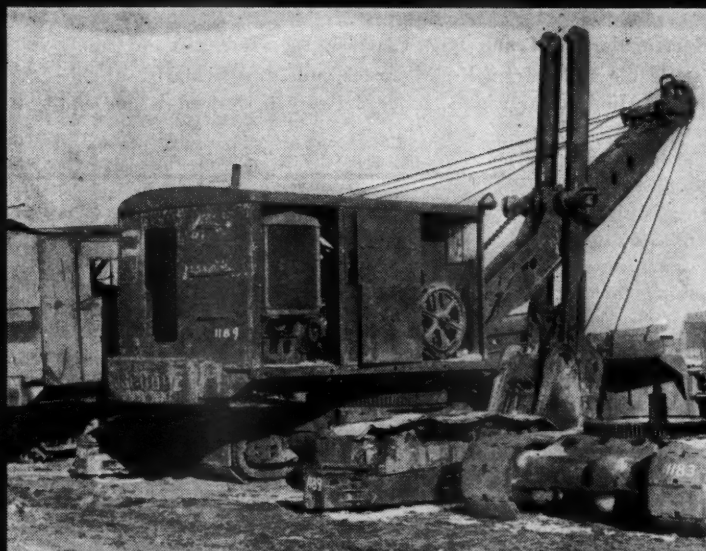
Even after it had gone through nine years of grueling service, this Osgood shovel looked good to the experienced construction machinery dealers who were bidding on it. Every one of the bidders was banking on the stamina built into every Osgood machine . . . they knew that there still were years of service left in this veteran.

That's what engineered design and precision manufacture means—long-lived, dependable, trouble-free service. It's an important fact to keep in mind when you're selecting your new equipment for postwar projects. We'll be glad to send complete information on the complete line of Osgood construction, excavating and materials handling equipment . . . to tell you how and why Osgoods will stay on the job, day after day, turning in better performance records at lower cost.

THE RECORD

Manufactured in 1936, this 1½ yard Osgood shovel had already turned in nine years of faithful service when it was offered at a recent surplus equipment sale. The bidders, experienced construction and excavating machinery dealers, knew the machine had been in service on the Alcan highway project for nearly two years; working under the most adverse conditions, with only sketchy provisions for maintenance. This Osgood, nine years old and offered "as is," brought the highest price of any of the 1189 pieces of equipment in the sale!

THE MACHINE



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ARMY E NAVY
OSGOOD
SHOVELS, DRAGLINES
CRANES

Operation of Screens, Grit Chambers and Sedimentation Tanks

(Continued from page 24)

The need for establishing a satisfactory cleaning cycle is just as important in connection with the grit chamber as with the bar screen. Operation is almost always done manually, for it seems to be impracticable to run this equipment by float control or by time clocks, because conditions change so much from day to day. It really takes very intelligent operation to produce a grit that is satisfactory for disposal on the plant grounds, and about the only way to determine a satisfactory routine is by the cut and try method. Grit equipment should be operated just as infrequently as possible and still get the desired results. Grit is very abrasive, and grit equipment has probably the shortest life of any equipment in the plant. Grit collectors should be built so that those parts which wear out rapidly are readily renewable at low cost; but even so, there is no point in wearing them out sooner than necessary. A close watch should be kept on all parts that are renewable and those parts replaced as soon as they have outlived their usefulness and before any of the non-renewable parts begin to take the wear intended for the renewable parts. In many cases it will be found that such renewable parts, particularly if they are wearing shoes, are reversible.

Grit chambers can generally be operated intermittently during normal flow conditions, and continuously during storm flows, if the system is combined. The operator will find it essential to be familiar enough

with the characteristics of his grit chambers to know when to begin continuous operation of the equipment, and to anticipate operating difficulties. In plants handling combined flows, grit chamber equipment should always be placed in continuous operation whenever a rain commences.

It is very difficult to obtain good performance with manually cleaned channels. They must be taken out of service for cleaning, which means that the units remaining in service may be overloaded. During the considerable periods between cleanings, the grit piles up unevenly in the channel with resultant short-circuiting and poor hydraulic conditions; organics settle out during low flows and there is no way of separating them from the grit, once they have settled. About all that can be done is clean them often enough so that the flowing-through area is not reduced enough to speed up velocities and cause the carry over of grit.

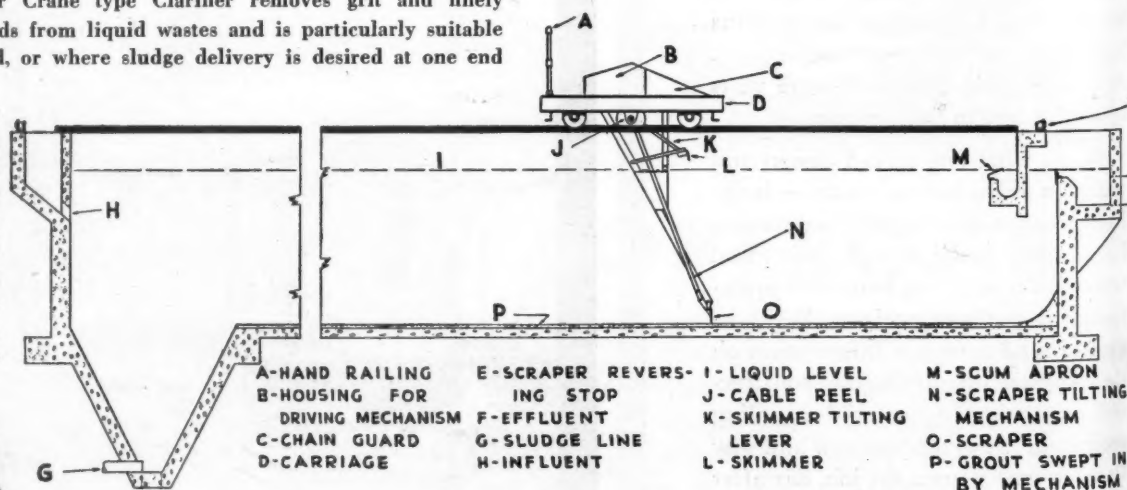
Hand-cleaned grit chambers are of simple design and it is generally practicable to install modern, mechanical grit-removal equipment in them. There is a wide selection of makes and types to choose from, and budget money could not be put to better use.

On the subject of grit washing, there isn't much to be told, at least from the operational standpoint. Washing grit by a separate piece of equipment has never been very popular and in our opinion there is no basic need for it except in rare cases. We find that engineers are specifying grit-washing equipment less and less and that the trend is toward the use of a design which permits the cleaning up of grit within the grit chamber itself—recirculation, as discussed earlier in this article.

THE HARDINGE RECTANGULAR CLARIFIER

The Rectangular or Crane type Clarifier removes grit and finely divided settleable solids from liquid wastes and is particularly suitable where space is limited, or where sludge delivery is desired at one end of the tank.

The mechanism is essentially a travelling crane from which is suspended a sludge scraper that lowers when moving toward the solids discharge hopper, and on reversal is raised from the floor to a horizontal position.



If you have not received your copy of the "HARDINGE POLLUTION REMOVAL AND BY-PRODUCT RECOVERY EQUIPMENT" circular, send for it RIGHT AWAY!

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At approximately 3 p.m.—less than 12 minutes later—snow is mealy slush that will quickly vanish.

SNOW-CLOGGED highways and ice-glazed streets this winter offer public officials two choices:

"Treating" the snow or ice with abrasives . . . consuming much time, labor and equipment, and accomplishing only temporary results.

OR—quick and effective removal of such wintry hazards . . . with Sterling Rock Salt!

Spread when a storm strikes, Sterling Rock

Salt prevents sleet and snow from bonding . . . keeps it mealy and easily whipped off to the sides by traffic action.

When snow is packed and ice is formed . . . Sterling "Auger-Action" Rock Salt bores through the largest masses . . . forms a brine which loosens the bond with the pavement . . . the shattered chunks broken by passing traffic are easily removed . . . the remaining brine will prevent any further formation of ice.

**Don't TREAT
Snow or Ice
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**Sterling
Auger-Action
ROCK SALT**

**Sterling
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- ★ Assures quick removal
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- ★ Makes driving safe

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INTERNATIONAL SALT COMPANY, INC. • SCRANTON, PA.

Grit washing is actually a misnomer. In the mind of a layman, a washed grit should equal beach sand, or something very close to it. Many companies manufacture a separate grit washer, but none of them will produce beach sand. Even among engineers, there is wide disagreement as to what the quality of a washed grit should be. Some engineers have considered a putrescibility of five per cent to be acceptable, whereas other engineers have insisted that anything over one per cent would be unsatisfactory. The putrescible test itself has little rhyme or reason to it and there has been no effort on the part of anyone over the past four or five years to do anything at all with the Dazey churn test which would increase its value. Under the conditions of the test, a washed grit containing a large amount of coffee grounds, fruit pits, and grain, would almost certainly have a putrescible value of less than one per cent. However, if that particular grit were allowed to decompose in a damp place where it would not dry out readily, there is little doubt but what it would be very obnoxious and probably cause just as much uproar as would a grit of four or five per cent putrescibility.

Our contention is (and this is the practice that we follow unless someone insists upon separate grit washing) that just as much can be accomplished by designing a grit chamber as hydraulically efficient as possible, and accepting the product from the grit chamber as a material which is not beach sand and which has to be disposed of either by burning, burying, or spreading on the land where it can dry out without causing offense, as by using a haphazard de-

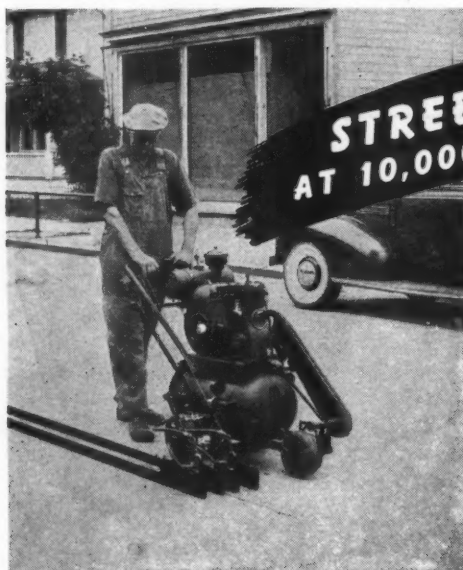
sign with a separate washer. Our own experience has been that a grit washer can be successfully eliminated ninety per cent of the time by using a channel designed correctly, and by correctly controlling velocity.

PART 3 — SEDIMENTATION BASINS

Any discussion covering the operation of modern sedimentation units must, of necessity, include both primary and secondary tanks. Since the proper operation and control of both types of basins is so very similar, with the exception of the scum removal problem, they may be handled together, rather than treated individually at the risk of considerable repetition.

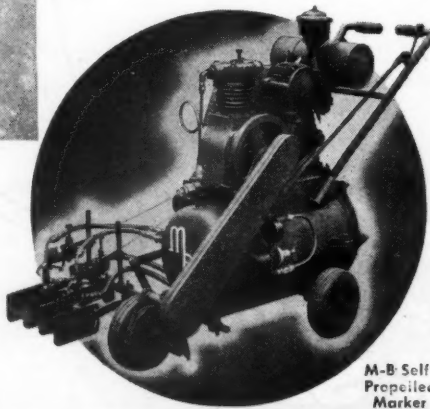
While removal of the floating materials, or scum, is essentially a function of the primary tank, it must also be considered in connection with certain secondary tanks, such as those which receive the flow directly from high-rate filters. Filters of this nature will at times produce a foam and also slough *Psychoda* larvae which will float on the surface of the final tank and which must be skimmed off if the final tank is to have good appearance and if the plant effluent is to be the best obtainable.

There are several important design factors which influence sedimentation tank performance. These factors include the volumetric capacity or detention period, the settling rate, velocity, the method of inlet distribution, the arrangement of effluent takeoff, and the sludge removal facilities present. Some of these factors undoubtedly were given careful consideration by the designing engineers and no further thought need be given them.



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BLADES**

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Various widths, lengths, thicknesses—flat or curved—standard or special—punched ready to fit your machine.

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Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.



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TYPE MO AND MS METERS FOR

WATER &

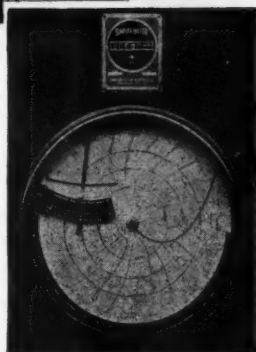
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• RAW SEWAGE • ACTIVATED SLUDGE •

METERS

Type MO and MS Meters for service as a flow indicator, recorder, indicator and recorder, indicator and totalizer, recorder and totalizer, or indicator, recorder and totalizer.



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SAYS FATHER TIME

"I have seen many a connection made in a water main, and none are so easy to connect up or last as many years underground as those employing MUELLER Tapping Sleeves and Valves. No 'just as good' sleeves or valves ever hold up as long. And solid-poured sleeves invariably cause trouble. They take pounds and pounds of lead and, worse still, those outlet joints which are so hard to pour correctly are often damaged when the drilling machine makes the cut. Leaks always develop after that."

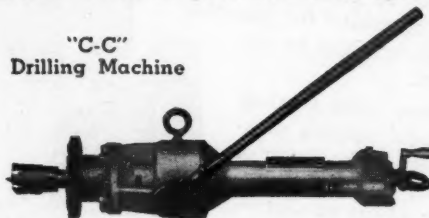
"For my money, I'll take a MUELLER Tapping Sleeve. Because the longitudinal joints employ a special type of gasket, only the ends need be calked. You save $\frac{1}{3}$ to $\frac{1}{2}$ the lead usually used and you cut installation time to a new low."

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"I have noticed, too, that in nearly every case you fellows prefer the MUELLER 'C-C' Drilling Machine for this type of job. It is a bear for hard work, and with care will last for years. Makes cuts from 2" to 12" in any size or type of main. Does the work UNDER PRESSURE anywhere in the line without annoying water shut-off."

For lifetime connections get MUELLER equipment. Send in your order today.

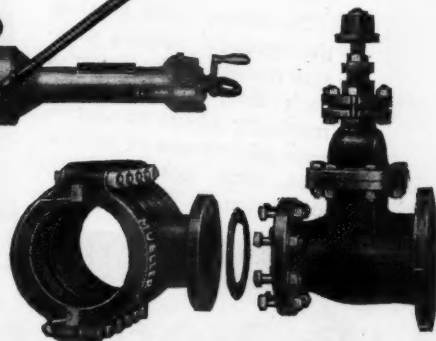
"C-C"
Drilling Machine



H-610 Sleeve

H-660 Valve

"BUY
BONDS"



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DECATUR 70, ILL. LOS ANGELES 23, CALIF.

Where such consideration was not given, the operator is apt to have a settling tank that is inefficient, and it is up to him to make the modifications necessary to bring the tank into balance. With some of the items enumerated there is considerable latitude, whereas with others there is nothing to be done except to make the best of maldesign.

The first item mentioned was the volumetric capacity, or the detention period. For best efficiency, the detention period of a settling tank should be maintained within a definite range.

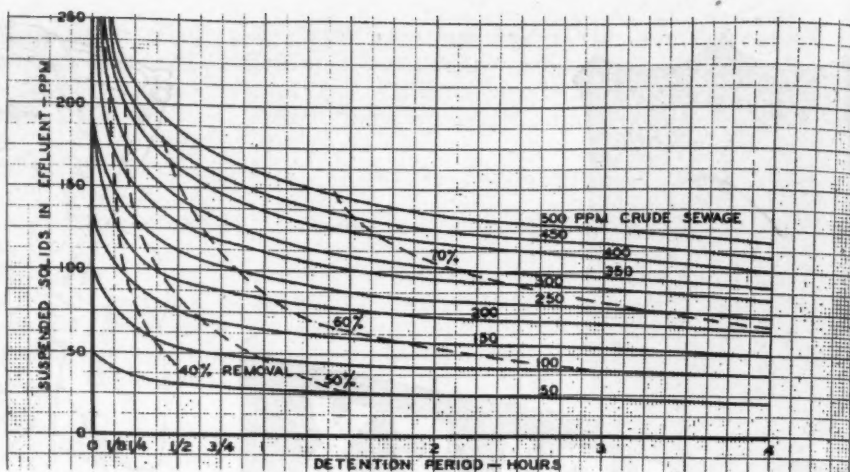


Fig. 7—Expected removals of suspended solids by settling tanks.

If the detention period is too low, insufficient removals will be obtained, resulting in a load increase on either the subsequent oxidation process or the receiving water; if too high, septicity may develop within the tank.

As a general rule, a detention period of more than two hours is not justified. Figure 7 illustrates the expected removals of suspended solids by a settling tank for various detention periods and various strengths of sewage. Notice how the curves tend to flatten out at the two-hour line. The slight additional removals obtained for periods longer than two hours do not justify the expense incurred in the construction and operation of the oversize tank. Minimum detention periods should be based on the maximum rate of flow through the tank. This means that somewhat higher detention periods are provided for average flow conditions.

Obviously the detention period of a tank is a fixed value and cannot be altered by the sewage plant operator. He should, however, know the limitations of his settling tanks and their influence on the overall performance of his plant. If he is blessed with multiple units he may be able to maintain proper settling conditions by cutting tanks in and out of service as needed. If a tank is taken out of service for any length of time, it should be kept filled with clean water or else all equipment should be liberally coated with oil to prevent rusting.

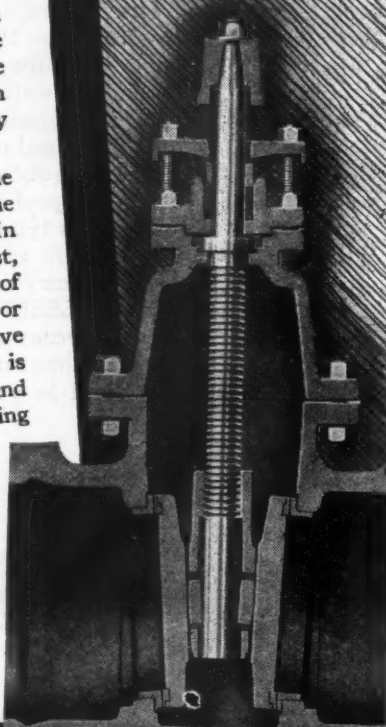
The settling rate goes hand in hand with the detention period, and the operator therefore has no more control over it than over the detention period. It is expressed as gallons per square foot per day, and is computed by dividing the flow by the tank area. Where there is a plurality of tanks to work with, and they can be cut in or out as seasonal load may demand, the settling rate will of course vary accordingly. Just what constitutes

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Only three simple parts . . . two bronze-mounted discs and a sturdy, cast-iron spreader . . . the R. D. Wood gate valve offers the simplest, most reliable gate design for long life and sure, easy operation.

As the gates are lowered, the discs reach a position opposite the brass seats before they spread. In opening, the spreader moves first, letting the discs move back, free of the seats, before rising. Opening or closing, they are free to revolve their full circumference. There is no scuffing to cause wear and leaks, no necessity for jamming the valves, no fight to get them open.

To insure tight seating, the spreader applies pressure equally at the center of each disc, so they automatically adjust to seats—even after years of service, and with possible body distortion.



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*Do you know
what it means to be
HUNGRY?*

Refugee children do. They know real hunger, bitter, maddening, day-after-day hunger.



*Have you ever been
really **LONESOME?***

Can YOU feel the bleak, hard loneliness of a soldier stationed on an island outpost far from the war fronts? Yes, YOU?



*Can you know a child's
UNHAPPINESS?*

Neglected children, "war babies," youngsters in trouble... can you put yourself in their places? Can you feel in your heart the tragedy of an unhappy childhood?



*Can you imagine
spending months in a
HOSPITAL ROOM?*

Thousands of soldiers have to *live* it, the cruel loneliness, the awful boredom.



*Ever been
HOMELESS?*

Families of brave people — friends who fought on our side—are wandering aimlessly today. Going home? They have no homes!

Give generously to
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When you need special information—consult the classified READER'S SERVICE DEPT., pages 83-85

the proper settling rate for the different types of settling tanks still seems to be a debatable subject, and several rates have been advocated by various authorities and State Boards of Health. In general, however, a primary tank settling rate of 1,000, no matter what the type of treatment, is acceptable. In the case of secondary tanks, those used in activated sludge plants are designed to have rates of from 800 to 1,000, those following conventional trickling filters are designed to have rates of from 600 to 1,000, and those following high rate filters are designed to have rates of from 600 to 1,200.

The horizontal velocity of sewage in a sedimentation basin generally does not come in for much consideration, at least during the design stage. A detention period commensurate with good design practice is usually se-

lected and a length-width ratio chosen which will result in an economical structure. Where a certain settling rate is desired, it is used, and the corresponding depth computed which will give the required volume and the required detention. Present day practice is to limit the forward velocity to something less than 2 feet per minute. The velocity in a sedimentation basin will vary, obviously, with a change in flow, and it may also vary because of improper baffling or because of wind effect. In the latter case, however, it is essentially a surface velocity and is of little importance with respect to overall tank performance. *(To be continued)*

Traffic Fatalities Rising

In the fifteen-year period beginning with 1927, traffic fatalities hit an all-time high in 1941 with 39,969 deaths. With the reduced traffic of war years, the toll dropped to 28,200 in 1942 and still further in 1943 to 23,800. In 1944, condition of cars and tires began to tell and the highway death list rose to 24,300. The first seven months of 1945 show a slight increase over the same period in 1944. "What will the awful harvest of 1946 be?" asks Charles M. Upham.

Lay-Out of Sewage Treatment Works

(Continued from page 28)

symmetrical or too orderly at the expense of additional length of pipe or the sterilization of land that might otherwise be useful in the future. Thus, drains are laid parallel to the main axes of the tank work, etc., and short cuts by diagonal routes avoided.

There is little justification for such practices, for while an ordered lay-out of tanks and filters is desirable for the sake of economizing land, improving the appearance of the works and to facilitate future extension, exaggerated tendency towards rectilinear pipe lay-out works in the opposite direction. Take, for example, the two lay-outs shown in Fig. 3. Both are alike in lay-out plan. But in Fig. 3A, the designer has been at pains to prepare an attractive appearance on paper and in so doing has greatly increased the total length of drain and main required, increased the number of manholes, reduced the available falls, or added to the depth of the suction wells at the pumping station. Fig. 3B may be much less attractive on paper, but in this case the designer has economized in his lengths of pipe, his number of manholes and his falls so as to achieve an efficient scheme, and he has not actually detracted from the appearance of his works which, on the ground, will be negligibly different in appearance from the scheme shown in Fig. 3A.

A Griffin Wellpoint Job!



DRY GROUND WAS
FIRST STRIPPED TO
WATER LEVEL

BEFORE

**THEN
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PUT DOWN
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**5 TIMES
FASTER**



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WAS HELD
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A well drilling outfit was first used to install mesh covered wellpoints—and could put down only 4 wellpoints to a depth of 20 feet in 3 days. The contractor THEN used the Griffin JET'N METHOD and averaged 20 wellpoints per day without a well drilling outfit. Think of the SAVING made by using the GRIFFIN SYSTEM. Moral: Buy or Rent Griffin Wellpoints in the first place.

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Chlorine Dioxide Treatment

The use of chlorine dioxide in water treatment is based upon its oxidizing capacity, which is $2\frac{1}{2}$ times that of chlorine. It oxidizes phenols to tasteless end products. It reacts rapidly with slowly reacting organic compounds that are not oxidized by prechlorination. But chlorine pretreatment is more economical for disinfection.

Chlorine dioxide is generated by connecting the feed line of a Wallace & Tiernan chlorinator to a mixing chamber into which a solution of sodium chlorite is metered, the reaction yielding chlorine dioxide. The theoretical ratio of chlorine to chlorite is 1:4, but there should be a sufficient excess of chlorine, and a ratio of 1:2 or less is recommended. The rate of flow of water through the chlorinator should be regulated so that the proper concentration of chlorine in the effluent is maintained.^{A100}

Department Bids On Its Own Contracts

A San Francisco public improvement project costing more than \$1,000 must be let by contract, but city departments may bid on such contracts, but must report monthly to the controller the accurate unit costs, including all direct and indirect charges. The water department generally bids on all cast iron mains, 4" to 16" gate valves and other accessories. Indirect labor costs—vacations, insurance, etc.—average 17% of the direct labor charge. For machine shop work, overhead averages 28%. Allowance for cost of inspection must be included in company bids. In nine contracts bid in by the department on which the labor costs aggregated \$23,160 the department saved \$1,885, and performed the contract \$1290 under its own bids. On machine shop work the savings have been relatively greater.^{F49}

Well Gives Record Flow

A gravel-packed well at Houston, Tex., one of six installed as part of the city's \$14,000,000 water supply expansion program, gave a flow of 5.2 mgd when tested. Two others yielded 4.4 and 4.5 mgd respectively. This is the largest yield ever given by a well drilled in that area.^{E20}

Chemical Solidification Of Soil and Concrete

The immediate solidification of loose siliceous deposits and similar porous material is obtained by injecting silicate of soda to which have been added small amounts of certain metallic salts to retard the gel-forming reaction on the immediate addition of a solution of strong calcium chloride. The resulting gel fills the voids and binds the soil grains into a solid, permanent, sandstone-like mass. This treatment can be used with any loose, not too fine,

The Waterworks Digest

Abstracts of the main features of all important articles dealing with waterworks and water purification that appeared in the previous month's periodicals.

sandy soil in depths not greater than 60 to 70 ft. The cost per cu. yd. of solidified soil at moderate depth "will rarely exceed that of good concrete."

The same chemicals can be used to stop leakages in concrete and old brick or masonry walls, or for sealing previous strata of rock; the chemicals being injected under considerable pressure. The process does not compete with concrete or cement grout, but is applicable under conditions where these are not.^{A98}

Municipal Water Works in Maryland

In Maryland a municipality is without authority to own or operate a utility or to issue bonds for constructing one except by special legislative enactment. Bond issues must be sold to the highest bidder; or, if all bids are rejected, at private sale at a price not less than the highest bid. Bonds must be serial, maturing in not over 40 yrs. if for waterworks. All construction must be in accordance with plans approved by the state board of health.

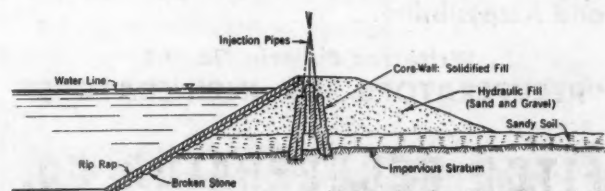
The organization of the waterworks can be any that the municipality wants.^{A99}

Water Purification At Omaha, Neb.

Omaha obtains its water supply from the Missouri river, which varies from time to time from being muddy to being awful muddy. Four types of water occur: Low turbidity and low color; heavier turbidity and high color; high turbidity and fairly low color; and extremely high turbidity—14,000 ppm—and fairly low color. Each type requires its own treatment. The processes employed are: Preliminary sedimentation; coagulation with aluminum sulphate; secondary coagulation and sedimentation; pre-chlorination; filtration; ammoniation and chlorination.^{F58}

Guam's Water Supply

The island of Guam has an area of 225 sq. mi. The northern half is a plateau of porous coral rock which absorbs a large part of a rainfall averaging 87.5 in. per year, which furnishes the water supply for the island. This fresh water floats as a lens on salt water which percolates in from the ocean. Water is withdrawn through shallow wells (3 ft. below ground water level) along the coastal area, deep wells (20 ft. after striking water) in



Core of earth dam made by chemical solidification.

the interior, and groundwater tunnels with skimming weirs. Some shallow wells 8 to 10 ft. square produce 250 gpm with only a few inches drawdown. Deep wells have 12" or 14" casing; no screens are necessary, only slots in the casing cut with a torch. Drawdown is limited to 18", which would cause an upward bulge of 40 times this, or 60 ft., of salt water; for this might reach the bottom of the well and contaminate the supply. Owing to variations in the porosity of the aquifer, yields vary from 300 gpm to 20 gpm by wells identical in all particulars.

To obtain larger yields, tunnels are driven, about 6 x 8 ft., inclined to a level 2 ft. below the water surface, then level for 150 or 200 ft. Water from the tunnel flows over a skimming weir into a sump, from which it is delivered to storage tanks by motor-driven pumps in an underground pumping station about 16 x 30 ft. Each tunnel delivers 2 or 3 mgd of water from the surface of the lens and very small drawdown. (The same idea used in Honolulu has been described at length in PUBLIC WORKS.) Chlorides in the fresh water lens range 942 to 68 ppm. Seabees had drunk water for months containing 600 ppm and a limit of 650 ppm has been set by the sanitary engineers. The U. S. P. H. S. standard limit is 250 ppm but humans in hot, tropical climates require much more salt than in temperate zones.^{E23}

Silencing Noisy Meters

The Chicago water department find that noise in meters with conical discs is due to the edge of the disc slot striking the division plate after balls and sockets had become worn. To remedy this, they set a piece of gum rubber $\frac{3}{8}$ in. thick into each edge of the slot, fastening it by small pins or brass screws into the top of the disc. With flat discs, they insert a strip of rubber in a groove cut into that edge of the slot which strikes the division

plate at the outlet port; also a groove is cut in both top and bottom faces of the disc $\frac{1}{4}$ in. from the outside edge entirely around the circumference, and a continuous length of rubber beading inserted in each groove.^{E24}

An Arsenite Orthotolidine Test

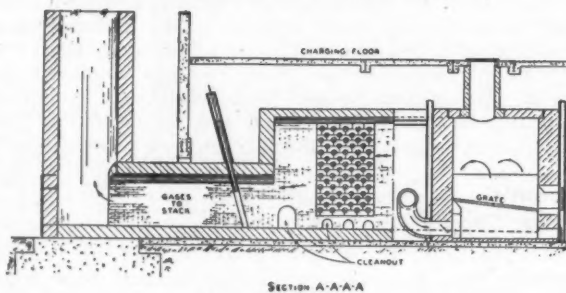
The author proposes that sodium arsenite solution be mildly acidified 1—to prevent a possible trace of false residual due to unexplained oxidation; 2—to avoid silicious deposits from common glass bottles; 3—to maintain the original acid reserve in the orthotolidine reagent to buffer the color reaction. That the concentration of sodium arsenite be doubled. That the sodium arsenite orthotolidine test be used instrumentally to yield direct readings for free chlorine, total chlorine, and interferences in a single set of determinations.^{G33}

Electronics In Waterworks

Glass electrode pH instruments are all based on the use of electronics. There probably will be increasing use of electronic techniques in telemetering equipment for transmitting measurements of flow, level, etc., radio transmission being used. There probably will be available before long a flow meter without venturi tube or orifice plate, but using the Doppler effect and electronic transmission of pulsations. Turbidimeters using photo-electric cells have been on the market for some time; so have also titrometers using electronic voltage measuring circuits. Supersonic sound waves for sedimentation or flocculation looks promising; small electronic flocculation units through which the raw water would flow at high velocity may take the place of sand filters. Electronic pipe locators are on the market.^{G32}

(Continued on page 77)

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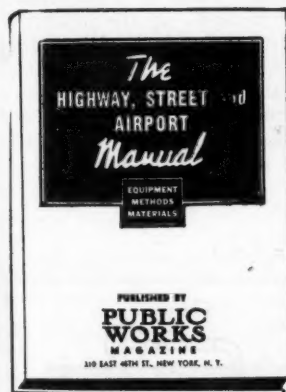
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MUD-JACK METHOD



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About equipment and materials!

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PUBLIC WORKS, 310 East 45th St., New York 17, N. Y.

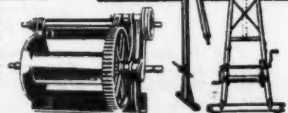


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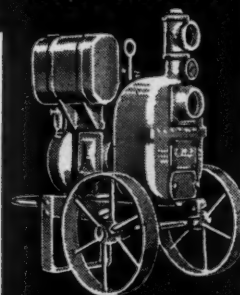
C.H.&E.

CONSTRUCTION EQUIPMENT

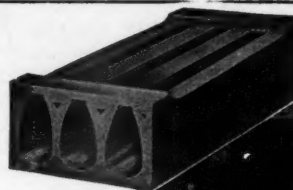
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C. H. & E. Manufacturing Co.
Milwaukee, Wis.



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NATCO UNIFILTER TILE FOR TRICKLING FILTER SYSTEMS

One piece underdrain
Egg-shaped run-off
Rapid, complete ventilation
Salt glazed surfaces

NATIONAL FIREPROOFING CORP.
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Streamlined INSIDE for Higher Efficiency and Lower Operating Costs

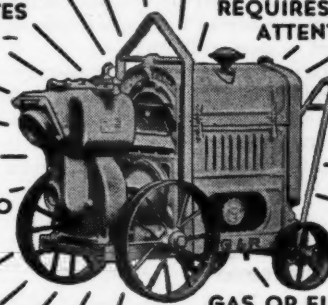
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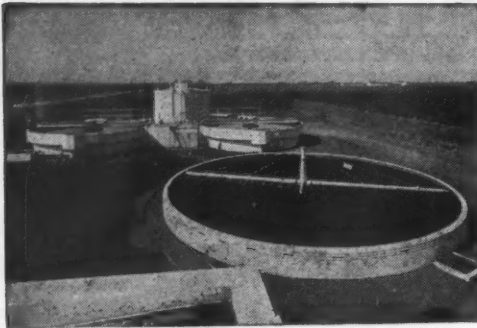
GAS OR ELECTRIC

Streamlined where it counts, you can't clog a Gorman-Rupp Self-Priming Pump. Unequaled in rugged efficiency, gallonage or continuous hours. A size and type for every need.

THE GORMAN-RUPP COMPANY, MANSFIELD, O

GORMAN-RUPP

SELF-PRIMING CENTRIFUGAL PUMPS



Disposal Plant at Stockton, Calif., state hospital.

Heavy Doses Of Chlorine

Laboratory tests were made to determine the effect of heavy doses of chlorine, to and beyond the break point, added to raw screened sewage, settled sewage, a mixture of 95% aerated effluent and 5% activated sludge effluent, and activated sludge effluent alone. These indicated that typical breakpoint chlorine residual curves are produced, with the hump area lower than with water. Ammonia begins to be destroyed with the first appearance of chlorine residual and completely disappears at the break. All appreciable B.O.D. reductions take place ahead of the break point, the maximum (per lb. of chlorine) at the first appearance of a residual.^{C87*}

Functioning Of a Bio-Filter

Study of the records of a bio-filter plant covering 14 months of operation confirm claims that where recirculation is practiced, the primary clarifier performs the double function of sedimentation and oxidation, somewhat comparable to the aeration tank of an activated sludge plant. The dissolved oxygen and the organisms furnished by the recirculation are responsible for oxidation and B.O.D. removals greater than can be expected by plain sedimentation. But such oxidation is negligible in winter.

The greater B.O.D. removal by the primary clarifiers in summer reduces the load on the filter at a time when it is capable of handling a greater load; the filter thus removing the greater percentage of impurities in winter and the primary clarifier in summer.

The major portion of the load applied to secondary treatment is removed by the secondary clarifier, but the filter at times removes a considerable portion of the B.O.D. and is not a mere colloid.

During passage of the sewage through the filter and secondary clarifier, substantial reduction in the number of coliform organisms takes place, but the number of total bacteria was at times higher in the final effluent than in the influent to the filter, with little or no reduction at any time.^{C68*}

Constructing Sewer In Quicksand

Last spring a contractor built 3,000 ft. of 15" to 21" clay pipe sewer in Texas City, Tex. on a route parallel to and approximately 100 ft. from the shore of Galveston Bay. The sewer was laid 3 to 6 ft. below sea level in quicksand. The soil was dewatered by a wellpoint system, as shown in the drawing, and the trench sides stood up with only vertical planks braced apart at 4 ft. centers. The sewer rested on 7" x 5" x 28" precast concrete cross supports, which in turn rested on 2" x 6" longitudinal timbers. Six lines of reinforcing bars passed through holes in the pipe supports. When the pipe was in place, concrete was placed under and around it for a minimum thickness of 6". The cost of this construction was only about two-thirds of that of methods previously used.^{H44}

*See bibliography in the September issue.

The Sewerage Digest

Abstracts of the main features of all important articles dealing with sewerage and sewage treatment that appeared in the previous month's periodicals.

Grease Removal By Activated Sludge

From studies conducted at Baltimore's Back River treatment plant to determine to what extent grease in sewage is reduced in amount by the activated sludge process, the following conclusions were reached:

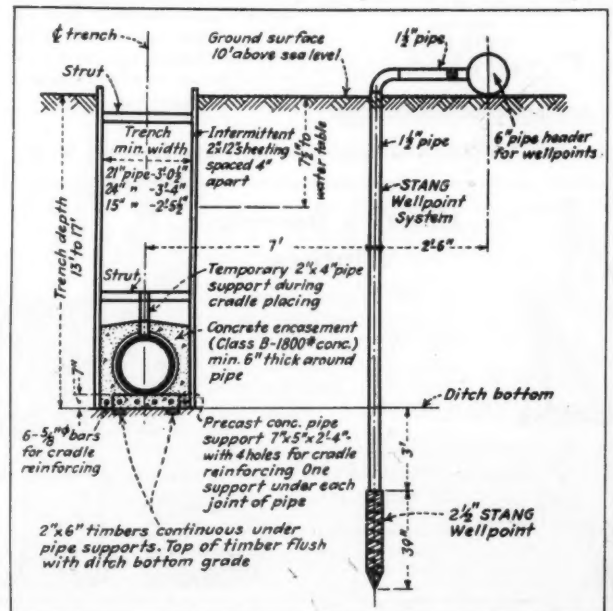
The experiments indicate that sewage containing large quantities of grease can be oxidized by the activated sludge process. There is a high removal of grease in the clarified effluent and a material reduction in the sludge-supernatant mixture. Whether these reductions can be maintained under continuous flow conditions remains to be seen. It was beyond the scope of these experiments to determine what the conclusions drawn apply only when results would be on a continuous flow basis. Therefore, the conditions are similar to those enumerated in the experiment.^{H38*}

Research Projects

The Research Committee of the Federation of Sewage Works Associations received reports in 1945 of 82 projects under investigation, of which 21 were in connection with sewage, 46 with industrial wastes, 7 with stream pollution and 8 with analytical methods. Of the industrial waste problems, paper wastes led with 14; food, canning and tannery, 5; 4 each for textiles and dyes, rubber wastes, and explosives; 3 each for sugars and fermentation, pickling liquors, and oil wastes; and 5 miscellaneous. There appear to be some unsolved problems still requiring attention in the treatment of textile wastes.^{C69*}

Results of New York City's Plants

The Interstate Sanitation Commission maintains inspec-



Courtesy Sewage Works Engineering
Section of ditch at Texas City.

tion of the various treatment plants in New York, New Jersey and Connecticut to determine whether they produce effluents which comply with requirements of the interstate compact. In its 1944 annual report it stated as follows concerning New York City's plants:

Bowery Bay activated sludge plant, compact requirements met.

Canal Street screening plant, requirements met.

Coney Island plant, sedimentation with coagulation, requirements met.

Cromwell Ave. screening plant, suspended solids removal not up to requirements.

Dyckman St. screening plant does not meet requirements.

Hammels screening plant, suspended solids removal inadequate but coliform elimination by chlorine satisfactory.

Hart-City Island plant, compact complied with.

Jamaica activated sludge plant, compact requirements met.

Oakwood Beach screening plant, the stipulated 60% suspended solids removal not obtained, coliform removal satisfactory.

Orchard Beach, full compliance.

Tallmans Island activated sludge, without disinfection, fails in coliform removal adequate for discharge into Class A waters.

Wards Island activated sludge plant using modified aeration gives an effluent "entirely adequate" for discharge into Class B water.^{H40}

Electric Fly Traps

At the Buffalo, N. Y., sewage plant the common house flies were a great nuisance; but since 1942 electric fly traps have been used and prove very effective. Flies trying to pass a bar grid are electrocuted by current passing through small bars about $\frac{1}{4}$ in. apart. These electrified screens are placed at doors and windows. Comparing the numbers killed at different locations in a 48 hr. period, 79 were killed at the grit room window, 705 at the boiler room and 1340 in the sludge disposal and incinerator building. In September one trap in the sludge disposal building electrocuted an average of 2,000 a day.^{G20}

Lubricated Plug Valves

The author prefers gate valves for isolated locations, where no throttling service is required and absolutely tight closure is not necessary. But he prefers lubricated plug valves where operation is frequent, proper supervision and maintenance are available for sludge lines, or where solids are present in the fluid, where throttling is desirable, and where tight closure is necessary.^{G21}

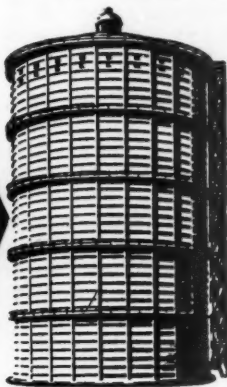
Use of Sewage Plant Data

Sewage works data should be obtained, recorded and examined frequently to serve as evidence of past performance; to show current accomplishments as to the adequacy, economy and effectiveness of the treatment; and to determine the need for extensions and improvements and provide a sound basis for designing them. The data should include the number of persons served and the tributary area; the volume of sewage; chemical analyses showing quantitative sewage constituents; volumetric measurements and analyses of screenings, grit, sludges, and by-products; bacterial analyses; and cost data as total expenditures allocated to capital expenditures, and to cost of operation and maintenance, divided as to labor and material. Quantitative and volumetric measurements and analyses should be made of screenings, grit, skimmings and sludges.

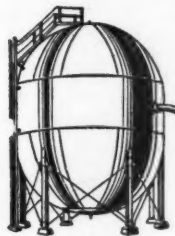
There should also be routine observations of wind, precipitation, temperatures of atmosphere and sewage, odors, tank operations, sludge additions and withdrawals, supernatant withdrawals, changes in procedure, effect of sewage and gases on buildings and equipment, etc.

Submit your Special "STEEL STRUCTURES" Problems to us

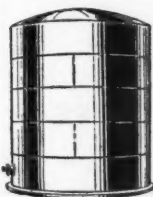
GAS HOLDERS



HI-PRESSURE TANKS



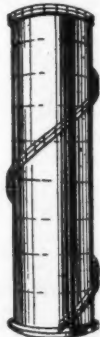
STORAGE TANKS



WATER TOWERS



STAND PIPES



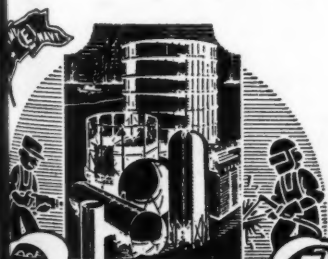
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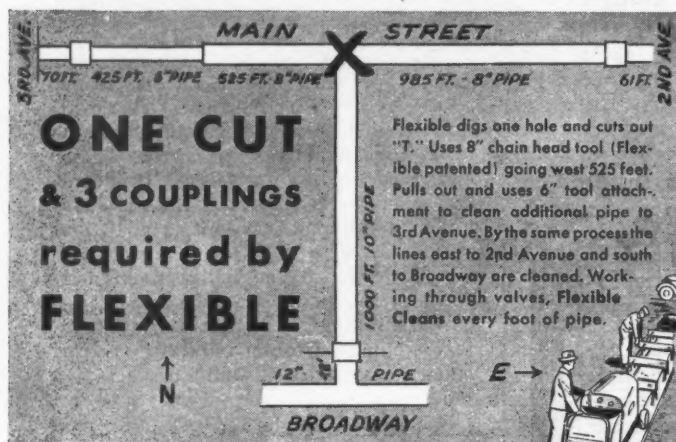


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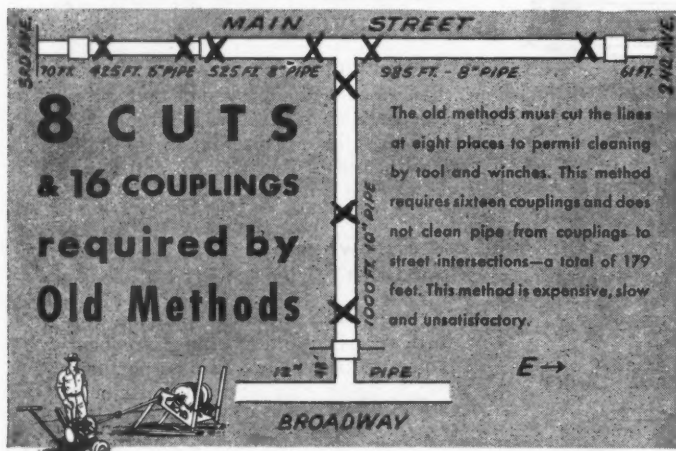
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SAVE CUTS IN THE STREET WITH FLEXIBLE



Diagrams show a layout of pipe lines and compare ordinary pipe cleaning methods to modern Flexible methods.
X MARKS DIG-UPS O MARKS VALVES



FLEXIBLE CLEANS EVERY FOOT OF PIPE

A FLEXIBLE pipe cleaning crew can clean these 3,114 feet of pipe of two different sizes from a single dig-up, whereas, ordinary cable-and-winch methods would require eight dig-ups and cuts in the line. Flexible tools and methods make the difference. And the difference amounts to a great deal of money when you consider the cost of each dig-up.

Flexible's special equipment and "know how" can save money for your city. Bring your toughest pipe cleaning problems to Flexible — no job is impossible.

WE CLEAN PIPE FROM 2" TO 72"

FLEXIBLE UNDERGROUND PIPE-CLEANING CO.

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The sampler is the most important factor. Others are the laboratory, and meters, thermometers and other measuring devices. Studies of many reports show that the greatest need is for more attention to checks and closures to permit dependable evaluation in any terms desired.¹³

Bibliography of Sewerage Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. indicates construction article; n, note or short article; p, paper before a society (complete or abstract); t, technical article.

- D** *The Surveyor*
August 10
28. Lay-Out: A Neglected Aspect of Sewage Treatment Works Design. By L. B. Escritt. Pp. 443-445.
- G** *Water Works & Sewerage*
September
19. c. Laying and Jointing Sewer Pipes. By Fred C. Palmer. Pp. 286-288.
20. Swat Flies at Sewage Plants. By George E. Symons. Pp. 289-290.
21. Lubricated Plug Valves Vs. Gate Valves at Sewage Plants. By E. A. Locke. Pp. 291-293.
- H** *Sewage Works Engineering*
September
42. Sludge Digestion Experiences at Buffalo, N. Y. By George F. Fynn. Pp. 430-433.
43. Temporary Relief From Oils and Greases. By A. H. Nills. Pp. 434-435, 456.
44. c. Sewer Construction Difficulties Eased by Dewatering Quicksand. Pp. 436-437.
- L** *Civil Engineering*
September
3. Getting the Most Out of Sewage Works Data. By William L. Havens and Frank Woodbury Jones. Pp. 399-401.
- P** *Public Works*
September
43. Boom Town San Diego Solves a Sewage Problem. By Byrl D. Phelps. Pp. 18-21, 44.
44. n. Patents and Mechanical Equipment in Sewage Treatment. P. 32.
45. Charge for Sewerage Services to Adjacent Communities. Pp. 42-43.

State Tests Atmosphere at Sewage Plants

The Department of Health of New Jersey has within the last four years developed a Bureau of Industrial Health which specializes in the study of toxic gas, mist, vapor, and dust exposures. This bureau is available at the request of any sewage works operator to make general atmospheric pollution studies of his plant and system, or for specialized sampling at his known trouble spots. Such testing is offered so that definite information on potential hazard spots will be known. This service is extended purely in the spirit of co-operation. In no instance are the results obtained to be used in issuing orders or notices.

If any sludge pump sump, chlorine feed line, or any other of those odoriferous areas are bothering an operator, he is asked by Director of Health J. Lynn Mahaffey to feel free to call on either the officers of the state association or this department directly for this service.

Sanitary Research in Texas

A program of co-ordinated research in sanitary engineering and public health is planned by the Sanitary Engineering and Public Health Research Council of Texas, members of which are drawn from research heads of Texas colleges and agencies supported by public funds.

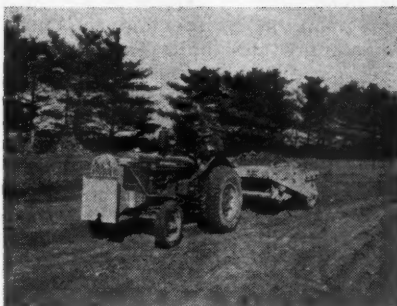
Keeping Up With New Equipment

LaPlant-Choate Releases 2-Yard Scraper

LaPlant-Choate Manufacturing Co., Inc.
Cedar Rapids, Iowa

One of the first post-war equipment units to be released by LaPlant-Choate Manufacturing Co., Inc., of Cedar Rapids, Iowa, is a small 2-yard front-dump scraper, Model CW-2. This scraper is the improved industrial counterpart of the wartime air-borne scraper which was used in large quantities by the Airborne Engineers for clearing roads and airstrips in inaccessible regions.

It is a sturdy yet light little scraper weighing only 2550 pounds. The two rear wheels can be located either inside or outside the cut and it can make a full 90° turn or less within a circle diameter of 20 feet. The hitch is designed for operation behind high speed rubber-tired industrial tractors, such as the International Harvester Model I-4. When fully loaded, weight is lifted from the tractor's front wheels and much of the weight of the load is centered on the tractor's driving wheels for maximum traction. Bowl and apron are



LaPlant-Choate 2-yard front-dump scraper

operated hydraulically by LaPlant-Choate's airborne pump, the same unit used to operate the famous tankdozer. A three position valve enables the cutting edge to be held in position and exert effective down pressure. Write the manufacturer for more complete description.

The F & P Rota-Sleeve for Large Flows

The Rota-Sleeve is a metal sleeve which fits into standard pipe toes from sizes 3" and up. V-port flutes designed with the greatest area at the top are

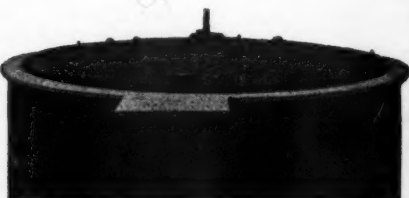
built in to offer a variable flow area for fluid passage. The flow enters the bottom of the Rota-Sleeve causing the flow indicating float to move upward, permitting fluid passage through the V-port flutes, with the float assuming a position in direct proportion to the actual rate of flow.

The Rota-Sleeve is made for direct reading and for remote reading in recording and recording-controlling types. Write for our bulletins 82-A and 83-A. They will be sent to you gladly, without obligation, upon your request to Fischer & Porter Company, 0000 County Line Road, Hatboro, Pa.

Propeller-Type Meter for Hot Water

Widely used for metering water at ordinary temperatures, Builders Propelloflo Meter is now available at no extra cost for metering hot water up to 250°F. A special high temperature grease is employed for efficient lubrication. Venturi design and all other special features of this streamline propeller-type meter are retained. The Propelloflo is extremely useful where a simple totalizing meter is desired. Further informa-

Over 250 P.F.T. Floating Covers in War Service



The health of our fighting men and war workers is being safeguarded by modern sewage disposal plants. We are doing our part by delivering on time P.F.T. Floating Covers and other sewage treatment equipment.

The P.F.T. Floating Cover for single and stage digestion hastens the digestion process, and provides for utilizing the sewage gas to heat water for the digester tank.

Catalog No. 232 contains complete information, including specifications. Write for your copy.

P.F.T. PACIFIC FLUSH-TANK CO.
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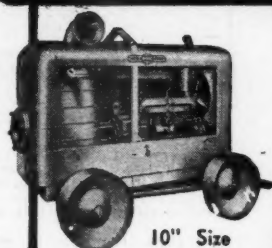
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AVAILABLE NOW POSTWAR MODEL JAEGER "SURE PRIME" PUMPS

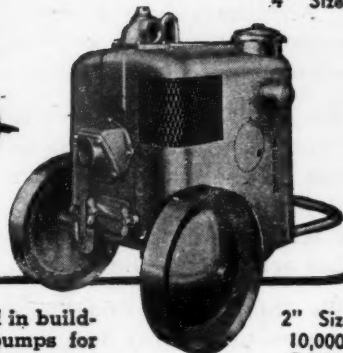


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Completely Enclosed,
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Improvements developed in building more than 50,000 pumps for toughest military service are now offered in these latest "Sure Primes" including complete all-weather protection of pump and engine in all-heavy duty models from 2" to 10" size. SEND FOR NEW CATALOG showing postwar features of design and performance in the world's biggest selling line of contractor's pumps.

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MIXERS • COMPRESSORS • HOISTS • LOADERS • PAVING EQPT.

tion may be had by writing Builders-Providence, Inc., (Division of Builders Iron Foundry) Providence 1, R. I.

A New Paving Joint Sealer

*The Philip Carey Mfg. Co.
Lockland, Cincinnati, Ohio*

The introduction of Careylastic, a hot-poured rubber-asphalt compound for sealing joints in concrete paving and construction, has just been announced by Mr. Lynn W. Young, Manager of Highway and Airfield Materials Department of The Philip Carey Mfg. Co., Cincinnati, Ohio.

Careylastic is a product containing rubber, asphalt and other ingredients,

combined to form a positive seal for expansion joints. The manufacturers say that foremost among the advantages of Careylastic is the perfection of the bond that is obtained and that throughout the entire range of annual temperatures, this infiltration-proof seal gives protection considerably in excess of all known specification requirements. Through the seasonal cycle of expansion and contraction, the flexible bond retains its resiliency and cohesion while permitting the normal compression and recovery of the non-extruding fiber joint filler. Due to the elasticity of Careylastic the seasonal variation in joint dimensions does not result in extrusion of

the seal, nor will its bond to adjacent construction break at low temperatures, thus a smooth, flush, watertight joint is maintained.

The method of heating and installing Careylastic is identical with the procedure followed in application of ordinary filler asphalt.

Careylastic now joins the other Carey street paving, highway and airfield materials, subgrade felt, asphalt crack filler and asphalt and fiber expansion joint, to complete this line.

Completely Automatic Load Starting Perfected for Diesel-Powered Generating Sets

The recent development of completely automatic Load-Control of Diesel-powered generating sets by engineers of the R. H. Sheppard Company, Hanover, Pa., makes it possible for operators of this type of equipment to realize still greater power-cost savings than they are now enjoying. Because Load-Control cuts operating time of the power plant to periods when power is actually required, it reduces fuel consumption and prolongs the life of equipment.

Load-Control is exactly what its name implies. The load demand on the power circuit controls the starting and stopping of the power source.

The flick of any lighting or appliance switch on an electrical circuit supplied by a Diesel-powered generating set equipped with Load-Control will automatically start the generator. Power is instantly available. Turn off the switch and Load-Control immediately stops the power plant.

Load-Control requires no special wiring. Simply connect to present service leads. Available for single or 3-phase generators. Load-Control will be available exclusively on Sheppard Diesel Generating Sets.

Economy Range Finder Promotes Life and Efficiency of Engine

*The White Motor Company
Cleveland, Ohio*

An instrument which combines the features of an ordinary speedometer with those of a tachometer and adds instructions governing various engine speeds is now offered by the White Motor Company under the name "Economy Range Finder." With this device on the instrument panel the driver can increase the life of the engine by keeping it within its most efficient range of operation.

The White Economy Range Finder helps drivers in shifting gears, saving fuel, conserving trucks, and making schedules. Not only can they read the engine speed directly on the speedometer dial, but instructions are clear. A spiral white line for each transmission gear is offered on the dial, and this is combined with a scale of r.p.m. printed on the speedometer pointer. As the speedometer pointer moves around the dial, the edge

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Rotary DISTRIBUTORS and AUTOMATIC DOSING SIPHONS

"PERFORMANCE PLUS"

That's how one of our leading Sanitary Engineers described the operation of his CARTER reaction type rotary distributor. And that's typical of the comments we've had on this precision built machine.

We sincerely believe this to be the best distributor mechanism on the market, and we feel justifiably proud of both the acceptance and the results it has achieved in the field.

We think you'll find "performance plus" aptly describes the operation of the CARTER units.



Our engineering and testing facilities are always available for technical assistance to our customers. Complete information on the CARTER rotary distributor or other CARTER mechanisms for water purification or sewage treatment will be gladly furnished without obligation.

RALPH B. CARTER COMPANY

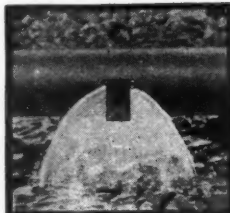
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DOSING SIPHON—For operation of the CARTER reaction rotary distributor, either direct pump feed or automatic dosing siphon can be utilized. With the siphon method illustrated above, filter beds are periodically dosed in fixed cycles dependent on plant flow.

NOZZLES—Illustration at right showing CARTER non-clog type bronze spray nozzles furnished as standard equipment with all rotary distributors. Their careful design and manufacture is such, that these units give a broad and finely dispersed spray, and a reported bed coverage of over 95%.



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of the pointer crosses the spiral white line for each gear, showing the r.p.m. A white area on the pointer indicates the ideal operating range from 1700 to 2400 r.p.m., and at either end is a red area which indicates when the engine is operating outside the proper range. When the pointer reaches the outer end of the spiral line for any gear, the engine speed (noted in the red) will be 2800 r.p.m., at which the governor is usually set.

As may be seen, the White Economy Range Finder is a simple but effective device to guide the driver in selecting the various transmission gears in which to operate under existing conditions. When the pointer crosses a white line at the outer end of the line, it indicates that the recommended maximum r.p.m. has been reached and that the driver should shift into the next higher gear. And when the pointer crosses a white line at the inner end, it suggests a shift into the next lower gear.

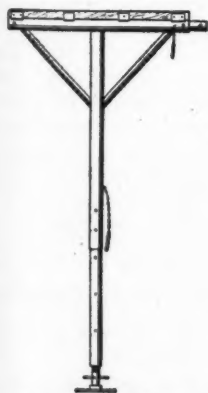
By staying within the r.p.m. economy range, represented by the white section of the pointer, the driver is assured of the most economical speed range for cruising or hard pulling. Results will be noticeable in cleaner combustion, greater gasoline mileage, better lubrication and cooling, and longer engine life.

The new White Economy Range Finder, it is enthusiastically estimated, will have a marked bearing on the efficiency of future trucking operations.

New Shoring Aid Developed

Ray J. Moths Company
714 W. Wisconsin Ave.
Milwaukee, Wisconsin

Realizing that the cumbersome and time-consuming method of building shoring out of lumber, for concrete forms was adding unnecessary costs to construction projects, Ray J. Moths, president of Ray J. Moths Co., Inc., of Milwaukee Wis., has just announced his invention of tubular steel Trusses and Tee-Posts.



Top: Adjustable Tee-Post



Above: Expandible Trusses

Moths tubular steel truss and tee-post

Calling on his long experience in the construction field, Mr. Moths has utilized steel tubing having a tensile strength of 110,000 pounds per square inch, sturdy enough to handle any form, for RJM Trusses and Tee-Posts.

Trusses are built sectionally, so that they can be quickly expanded or shortened for any need—thus making them practical for use with any architectural design. Tee-Posts, which have a screw adjustment feature at the bottom, similar to an automobile jack, may be used in conjunction with the trusses, thus making them equally practical for floor and wall shoring, as well as beams and pilasters.

Proven by field tests and actual use

on large construction projects, this line of Trusses and Tee-Posts will soon be made available to builders on a purchase or lease basis through equipment dealers. Interested parties may write the manufacturer for descriptive literature.

Wire-Wound Prestressed Concrete Pressure Pipe

Lewiston Pipe Co.
Fort Wayne
Indiana

In the manufacture of the pipe the following steps are taken:

(1) The Hume centrifugal process is employed to make the pipe in 12 ft. lengths. The initial shell thickness for

for 1946! —
first again!

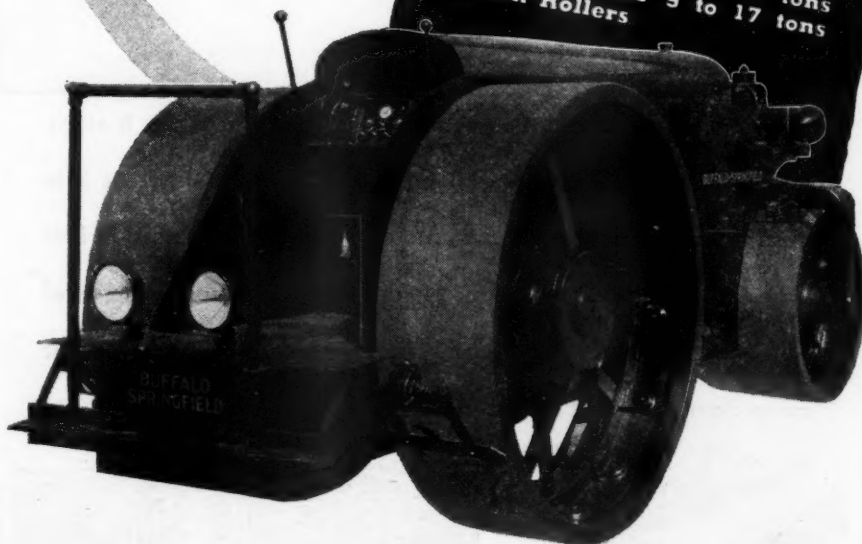
Two 1946 Three-Wheel Rollers
AVAILABLE NOW!

Model VM-31 10-ton
Model VM-32 12-ton

• These new, better Buffalo-Springfield Rollers lead the coming procession of other efficient 1946 Buffalo-Springfield models.

Write or call your Buffalo-Springfield dealer today.

Watch for announcement of the 1946
3-Wheel Rollers 6 to 8 tons
Tandem Rollers 3 to 17 tons
3-Axle Tandems 9 to 17 tons
Trench Rollers



Write for data



BUFFALO-SPRINGFIELD

The Buffalo-Springfield Roller Co.

Springfield, Ohio

The Oldest and Largest Builder of
Road Rolling Equipment in America

When you need special information—consult the classified READER'S SERVICE DEPT., pages 83-85

24 and 30 in. pipe is 2.5 and 3 in. for 36 and 42 in. diameters. The shell thickness is controlled by end rings which also serve as anchors for the 5/16 in. longitudinal steel bars. The form assembly for 24 in. pipe is shown in the inset of Fig. 1. The 12 longitudinal steel rods are threaded at each end and extend through the end rings. By screwing nuts on these rods, at each end, against the end rings with stress wrenches, the rods are prestressed to 75,000 p.s.i. when high carbon steel is employed and 20,000 p.s.i. when ordinary billet steel rods are used.

(2) The concrete mixture is made with standard portland cement and

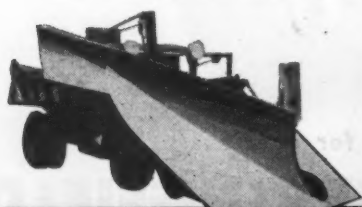
carefully graded fine and coarse aggregates which are thoroughly mixed for more than 3 minutes with about 4.5 gal. of water per sack (94 lb.) of cement. A pumpcrete machine is now used to place the concrete in the molds in uniform layers throughout the full length of the pipe.

Approximately 12,000 feet of this pipe was installed in Chicago in 1942 for water and 13,100 feet were constructed for sewage force mains for Hammond and East Chicago, Ind.

The manufacturers have some interesting literature on this new method of making concrete pipe for those interested.



One of the many exclusive features of the Frink is that it eliminates the snow packing itself into the adjoining snow as it is carried to the side. This prevents side thrust. The snow is first raised on the forward portions of the moldboard, above the level of the banks, before it is carried to the sides. Write today for more detail on the Frink special features.



FRINK
SNO-PLOWS

CARL H. FRINK, Mfr., CLAYTON, 1000 Isl., N. Y.
DAVENPORT-BESLER CORP., DAVENPORT, IOWA
FRINK SNO-PLOWS OF CAN. Ltd., TORONTO, ONT.

When you need special information—consult the classified READER'S SERVICE DEPT., pages 83-85

A Concrete Mixer Embodying Many New Features

*The Jaeger Machine Co.
Columbus 16, Ohio*

Transmission drives direct to drum and through sprocket and chain to ball bearing hoist shaft for operating skip. (No backlashing cable). Heat treated steel gears run in oil bath. Chilled cam operates skip shaker.

Transmission so smooth it cuts noises 90% and increases efficiency from 30 to 40%. Blades are self cleaning. Spaces between buckets and flights allow concrete to cut back to charging side, preventing overloading of discharging side. When discharging, spoon bridges this gap, catches all concrete carried up by buckets. All features fully described and illustrated in catalog M5. Write Jaeger Machine Co. for a copy.

Bailey Open Channel Meters

Bailey Meter Company, Cleveland 10, Ohio, has published Bulletin No. 62 featuring Bailey Open Channel Meters for sewage industrial wastes, sludge, and irrigation water. The meters described in this bulletin are of both the direct mechanical and the electronic telemeter type. A wide selection of registers having various combinations of indicating, recording and integrating features is illustrated. Alternate methods for mounting registers on wall, panel and pedestal are also shown.

All types of registers are said to be suitable for use with flumes, weirs, and atmospheric discharge nozzles. Outstanding features claimed are: Low Cost, Easy Installation, Self-Cleaning, Availability of Automatic Control.

Safety Control System for Diesel Engines

Data Sheet R-18, just released by Viking Instruments, Inc., Stamford, Conn., announces the Viking Type R-18 Safety Control System for the Shut-Down of Diesel Engines when temperature of the circulating-water system becomes too high, or when there is insufficient lubricating oil pressure. The Data Sheet contains complete information on operation, with detail drawings of general arrangements, installation and operating instructions, and ordering information. The type R-18 control system is self-operating and requires no electrical power or additional accessories.

A New LeTourneau Catalog

*R. G. LeTourneau, Inc.
Peoria, Illinois*

Latest information on modern, high-speed earthmoving and lifting equipment is contained in the new LeTourneau Equipment Catalog, just off the press.

Profusely illustrated, this book describes and pictures the entire LeTourneau equipment line including: single

and double bucket Carryall Scrapers, tractor cranes, Tournacranes, Tournalift, Rooter, Sheep's Foot Roller, Tilt-dozer, large and small Tournapulls, Tournatrailer, Tournatruck, and Power Control Units.

Operational features of each tool are fully described and specifications given, and improvements over older models are analyzed in detail.

Full-page illustrations are detailed, showroom-type photos, which are augmented by on-the-job action pictures of equipment in various applications.

Replacement parts, Tournarope, and Tournaweld Electrodes are also presented, as are the nation-wide specialized LeTourneau distributor shop and service facilities.

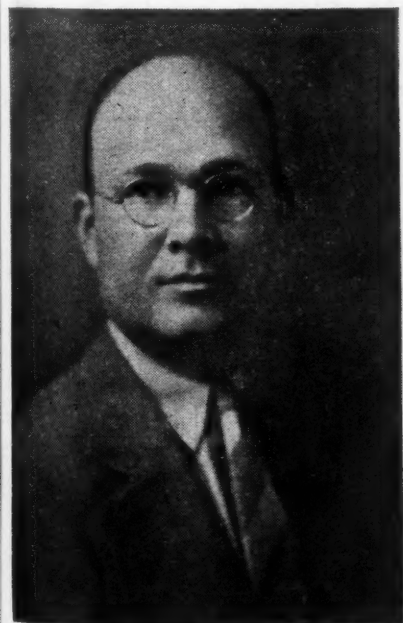
A single book telling the complete LeTourneau equipment story, the catalog is available to anyone desiring a copy. It can be obtained from any LeTourneau distributor, or by writing directly to R. G. LeTourneau, Inc., Peoria, Ill. Ask for Form No. G-1066.

Carlisle F. Smith Now Executive Engineer for Ward LaFrance Truck Division

Mr. Smith has announced his acceptance of an executive position at the Ward LaFrance Truck Division of Great American Industries, Inc., Elmira, N. Y., and his resignation from the American LaFrance Foamite Corporation. At Ward LaFrance he will act in the capacity of Executive Engineer.

Mr. Smith's services were requested some months ago as a Technical Consultant in connection with certain secret United States Army Engineers Intelligence to be investigated in Germany and he has just returned from that investigation.

The European assignment carried with it the assimilated rank of Colonel. The execution of this work involved



Carlisle F. Smith

contact with numbers of German Scientists, Engineers, Chemists and Industrial Executives throughout Central and Southern Germany, the Ruhr, the Rhineland and parts of Austria.

A graduate of Purdue University Mr. Smith has had twenty-five years' experience in the fire apparatus and automotive industry as an engineer and executive of the American LaFrance organization as factory manager and vice president.

Ralph Horton, president of G.A.I. and A. Ward LaFrance, vice president in charge of the Elmira division, says that the acquisition of Mr. Smith for the Ward LaFrance staff is in keeping with their plans for extensive broaden-

ing of operations during the post war period.

Already the Ward LaFrance plants have been converted to peacetime production and are busy turning out commercial trucks and tractors in large quantities as well as all types of fire apparatus. In order to keep pace with accelerated production schedules the company has greatly expanded its engineering and manufacturing facilities, and work has just been completed on a new, ultra-modern office building.

Additional executive appointments include D. L. Gundry, chief engineer of Motor Truck Division and N. G. Bjorck, acting chief engineer of Fire Apparatus Division.

PLANNING A SMALL PLANT?

If you are . . . or will be planning a small sewage-treatment plant . . . you will want to know, *in advance* . . . how your community can be *fully* protected by *complete* sewage treatment, comparable to the *best* in larger cities.

Get the facts by calling in a Rex Sanitation Engineer. There is no obligation. Plan with him. Let him show you the simplicity, economy and efficiency that Rex Sanitation Equipment makes possible in small sewage-treatment plants.

Here are a few of the many advantages offered by Rex:

The Rex "M.I." type mechanically cleaned Bar Screen is engineered specifically to give all the advantages in design and construction found in large plant units.

The Rex "M.I." Conveyor Sludge Collector and Skimmer reduces installation costs and maintains plant efficiency.

The Rex "M.I." Grit Collector is a simple, ruggedly constructed unit that assures low installation cost and high efficiency for the smaller plant.



The Rex Aero-Filter is an exclusive process that eliminates the need for excessive recirculation and oversize primary settling tanks. It materially reduces the size and operating cost of the plant.

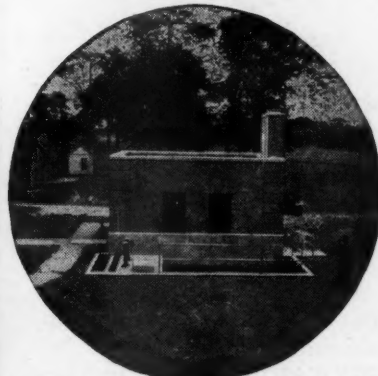
Specially trained Rex sanitation engineers can help you with your problems. For complete information, write Chain Belt Company, 1722 West Bruce Street, Milwaukee 4, Wisconsin.



Rex "M.I." mechanically cleaned Bar Screen and Rex Grit Collector.



Rex Aero-Filter permits much larger daily capacities with smaller filter bed.



Small primary settling tanks equipped with Rex "M.I." Conveyor Sludge Collectors.



SANITATION EQUIPMENT

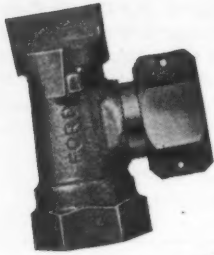
Triturators • Bar Screens • Tow-Bro Sludge Removers • Slo-Mixers
Aero-Filters • Rapid Mixers • Grit and Sludge Collectors and Grit Washers

CHAIN BELT COMPANY OF MILWAUKEE

Member of the Water and Sewage Works Manufacturers Association, Inc.

When you need special information—consult the classified READER'S SERVICE DEPT., pages 83-85

Ringstyle VALVES



Quality inverted-key angle valves with coupling nuts for water meter attached. Made in three sizes. Connect to iron, copper or thin-wall lead. Simple. Easy to install. Ask for further information and free sample of RINGSTYLE Valve.

FORD

Meter Box Co.
WABASH, INDIANA



1st Step Toward CLEANED SEWERS

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equipment—

Get the new Stewart catalog describing fully the full STEWART line. A postcard will bring your copy at once, without obligation.

W. H. STEWART

P. O. BOX 767 SYRACUSE, N. Y.

"Since 1901"

Osgood and General Excavator Announce Appointment of Four New Distributors

The General Machinery Company, Spokane, Washington, will provide sales, maintenance and warehouse service in the Inland Empire region. American Equipment Corporation, with headquarters at Harrisburg, has taken over the combined Osgood-General franchise for several Pennsylvania counties. The Central Iowa territory will be served by the Carl R. Miller Tractor Co., well-known distributor in Des Moines. One Canadian appointment, J. S. Innes, Ltd., of Leaside, Ontario, also was announced. The Innes organization will handle the Eastern Ontario franchise.

These four new Osgood-General distributors are prepared to offer complete information on the many new machines and design developments being planned by both Osgood and General. Included in the list of equipment being readied for the tremendous construction boom predicted for the United States and Canada are the General Type 10, a one-man-operated, one-engine-powered, all-purpose unit mounted on pneumatic tires and the Osgood Type 100, a 2½-yard unit that will be available in Shovel, Dragline, Clamshell and Crane models. Osgood's new ¾-yard Type 5 will be a full-revolving machine with a complete range of Front End Attachments.

International Harvester Promotes Truck Salesmen

E. H. Watkins has been promoted from assistant branch manager, New York City, to manager of a new motor truck branch which is being established in Syracuse, New York. Mr. Watkins started at the Cleveland motor truck branch in 1935 as a salesman and in 1937 became retail sales manager. In 1939 he was transferred to New York where he was in charge of sales promotion. In 1943 he became assistant manager at New York.

Paul McLaughlin has just been promoted from the position of national account supervisor at New York to assistant manager, where he will specialize on fleet sales. Mr. McLaughlin started with International Harvester at the Philadelphia motor truck branch in

PUBLIC WORKS for October, 1945

1919. He was transferred as salesman in 1922 to New York and in 1925 became retail manager of the Bronx branch. In 1928 he was transferred to the Manhattan branch as retail manager, and in 1940 took a similar position at the Rochester branch. He returned to New York as national account supervisor in 1944.

E. C. Hidlay Rejoins Meter Com- pany Sales Force

A. J. Kerr, General Sales Manager of Pittsburgh Equitable Meter Company, has assigned E. C. Hidlay to the sales force. During the war years, with sales activities greatly restricted, Mr. Hidlay was brought in from his territory of Western New York and placed in charge of the export department at the home office in Pittsburgh.



E. C. Hidlay

He has now been reassigned to his old territory which embraces Western New York State and several counties in Pennsylvania and Ohio. He will handle the sales and service of Pittsburgh-Empire water meters in this area.

Mr. Hidlay will operate from the Pittsburgh district office, under the supervision of W. S. Andrews, district manager, and will make his home in Buffalo.

Fifth "E" Star Awarded to De Laval

In recognition of the continuation of its excellent production record, the U. S. Navy has awarded the De Laval Steam Turbine Company a Fifth Star for the

INCINERATION ENGINEERS

NICHOLS ENGINEERING & RESEARCH CORPORATION

60 WALL TOWER

NEW YORK, N. Y.

Consultants • Designers • Constructors

Bibliography of Waterworks Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. indicates construction article; n, note or short article; p, paper before a society (complete or abstract); t, technical article.

A Journal, American Water Works Assn.

September

98. Chemical Soil Solidification and Chemical Sealing of Leaking Concrete. By C. Martin Riedel. Pp. 849-862.
99. Municipal Water Works Organization in Maryland. By Harry B. Shaw. Pp. 863-868.
100. A Variety of Water Problems Solved by Chlorine Dioxide Treatment. By John F. Synan, J. D. MacMahon and G. P. Vincent. Pp. 869-873.
101. Utica, N. Y., Survival and Retirement Experience With Water Works Facilities. Pp. 874-896.
102. Clinton, Iowa, Survival and Retirement Experience With Water Works Facilities. Pp. 897-904.
103. Tentative Standard Specifications for Deep Wells. Pp. 913-962.

D The Surveyor

August 17

18. Droughts in the Sydney Catchment Areas. By F. W. F. Waitt. Pp. 472-473.

August 24

19. p. Underground Waters. By Edward Bailey. Pp. 481-484.

E Engineering News-Record

August 3

20. n. Well at Houston Produces Record Flow. P. 95.

September 6

21. C. Multiple Grouting of a Dam Foundation. By L. F. Harza. Pp. 103-105.
22. Industrial Water Supply Features Siphon Intake and Submerged Pumps. By L. N. Reeve. Pp. 116-118.
23. Groundwater Development on Guam. By Glen H. Abplanalp. Pp. 120-123.
24. Repairing Chicago's Water Meters. Pp. 124-127.

F Water Works Engineering

August 22

47. Coliform Organism Detection as Handled at Indianapolis. By C. K. Calvert. Pp. 936-937.
48. c. Underwater Crossing on Piers Withstands Every Test. By Lyndall K. Parker. P. 940.
49. Water Department Bids on Its Own Contracts. By N. A. Eckart. Pp. 942, 965.
50. c. Five mg Prestressed Concrete Tank Built at Great Falls, Mont. Pp. 945-946.
51. n. Ohio Water Supply Group to be "Water Resources Board." P. 960.

September 5

52. Water Supply Proves Adequate in World's Highest Fire. By Roi B. Woolley. Pp. 1010-1012, 1062.
53. Municipal Water Company Builds Consumers' Goodwill. By H. M. Gerber. Pp. 1013-1015, 1054.
54. Experience in Supply Problems Covering Four Decades. By W. W. Hurlbut. Pp. 1016-1018, 1048.
55. Wartime Practices in a Large Water Utility Group. By George W. Biggs, Jr. Pp. 1019-1020, 1064.
56. Operating Practices Developed in a Suburban Community. By James B. Conlan. Pp. 1021-1023, 1066.
57. Historic Filter Plant Adapted For Softening Equipment. By Donald H. Maxwell. Pp. 1024-1027, 1070.
58. Water Purification Practices at Omaha, Nebr. By Fred B. Lasell and Della E. Johnson. Pp. 1031-1033, 1076.

G Water Works and Sewerage

September

30. North Chicago Doubles Its Water Supply Facilities. By Charles Heblor. Pp. 265-267.
31. The Protection of Motors and Controls Against Moisture. By H. V. Crawford. Pp. 268-270.
32. p. Electronics in Water Supply and Sewage Treatment. By D. M. Nielsen. Pp. 271-274.
33. Direct Reading Arsenite-Orthotolidine Test. By A. A. Hirsch. Pp. 277-279.

J American City

September

14. Waterbury's Water Supply Plans Pay Off. Pp. 100, 131.
15. Ranney Type Collectors Solve Manitowoc's Water Problem. By Earl Walter and R. E. Cannard. Pp. 112-113.
16. How Joint Action of Nine Cities Met Greatly Expanded Water Needs. By J. S. Longwell. Pp. 121-123.

M Water and Sewerage

August

13. Mortality Experience With Ottawa Waterworks Facilities. Pp. 17-22, 46.
14. Mechanical Flocculation of Water: Does It Pay? By Neil Munro. Pp. 23, 43.

P Public Works

September

29. Water Supplies for Scattered Populations. Pp. 17, 38.
30. Developing Additional Ground Water at Fort Dodge. By John W. Pray. Pp. 26-27, 38.
31. Moving a Water Main and Meter While Maintaining Service. By C. M. Abbitt. Pp. 30-31.
32. Handling Dry Chemicals. P. 42.
33. Laying a 48-Inch Main Across Streams. Pp. 52, 54.

V Journal, Maine Water Utilities Ass'n

September

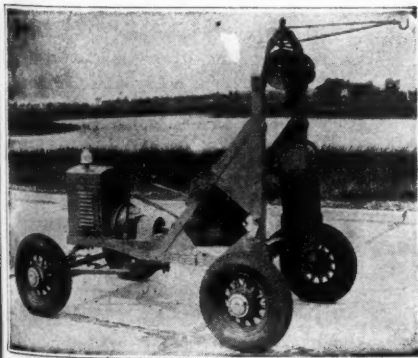
7. Organization and Operation of Water and Sewer Districts. By Lyndall K. Parker. Pp. 91-96.

W Johnson National Drillers' Journal

July-August

3. Ground Water Records. Pp. 1-7.

KEEP THOSE SEWERS OPEN!

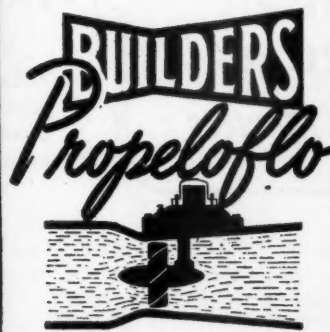


Sewers clogged with sand, roots and other debris are a constant danger to public health and safety. New installations rapidly lose their efficiency due to sand seepage.

You positively can keep the sewers of your city open with an OK Champion—the cleaner that does the entire job from street level. Dig-ups practically a thing of the past.

Three Distinctive Models Available. Write Now for Literature.

CHAMPION CORPORATION
4752 SHEFFIELD AVENUE, HAMMOND, INDIANA



A propeller-type flow meter for water service by the makers of Venturi Meters, Venturi Controllers, Chronoflo Telemeters and a broad line of related water and sewage works equipment.

Send for Bulletin 350. Address Builders-Providence, Inc. (Division of Builders Iron Foundry), 16 Coddling St., Providence 1, R. I.

Sincerely BUILDERS-PROVIDENCE

Navy "E" Flag which has been held by that company without lapse since the awarding of the first Navy "E" to De Laval in May, 1942.

The products furnished by the De Laval Steam Turbine Company to the Navy include: steam turbines, reduction gears, worm gear speed reducers, centrifugal pumps, IMO oil pumps, centrifugal compressors and blowers.

Major Tobin Returns To Electro Rust-Proofing Corporation

Announcement is made by the Electro Rust-Proofing Corporation, Dayton, Ohio, that Major Frank M. Tobin has

resigned his commission with the Army Air Force and resumed his connection with that company, where he is production manager.

Major Tobin assisted in the organization of the original Electro Rust-Proofing sales force and entered the service in 1942.

Hendrick Names Warner Sales Manager

Trowbridge A. Warner has been appointed Sales Manager of Hendrick Manufacturing Company, Carbondale, Pa., effective October 1.

Mr. Warner was formerly Sales Man-

ager of the Register and Grille Manufacturing Company, Brooklyn, N. Y., and before that held a similar post with Tuttle & Bailey Manufacturing Company. Hendrick manufactures a complete line of perforated metals, architectural grilles, perforated metal screens, Mitco Open Steel Flooring, Mitco Armorgrids and Mitco Shur-Site Treads.

Wilson Pulsafeeder Sold to Lapp Insulator Co.

Exclusive rights to the Pulsafeeder chemical proportioning pump, introduced six years ago and since marketed by Wilson Chemical Feeders, Inc., of Buffalo, N. Y., have been purchased by the Lapp Insulator Co., Inc., Le Roy, N. Y.

The Lapp organization through its Process Equipment Division now markets chemical porcelain valves, pipe, raschig rings, and a wide line of corrosion-free process equipment.

Lawrence E. Wilson, who invented and developed the Pulsafeeder, and Victor H. Liepold, Service Engineer, as well as other Wilson personnel, have become affiliated with Lapp and will continue in responsibility for Pulsafeeder engineering, manufacture and service. Wilson Chemical Feeders, Inc., of Buffalo is not otherwise affected by the Pulsafeeder transaction and will continue the manufacture and sale of filling machines and other products.

E. E. Matheson Sales Manager of Merco-Nordstrom Valve Co.

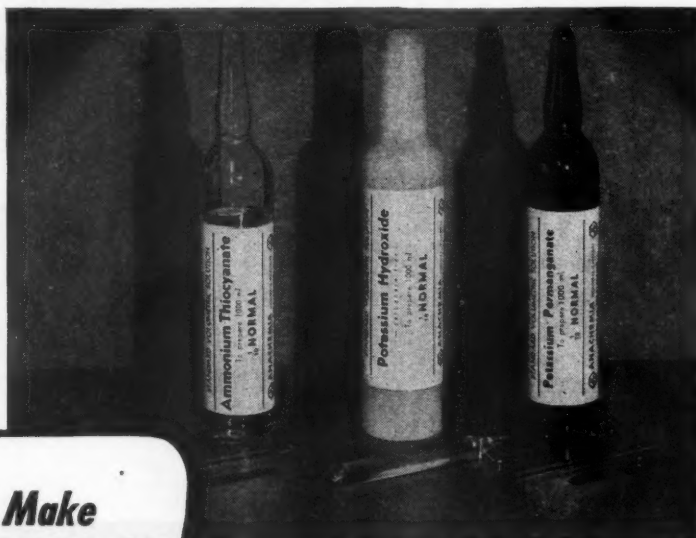
Pittsburgh-Equitable Meter Co. has announced the appointment of E. E. Matheson as Sales Manager of the Merco-Nordstrom Valve Co., a division of the parent firm. Since 1928, Mr. Matheson has been associated with Merco-Nordstrom, first as a sales engineer and then as a branch manager. In 1940 he was appointed Asst. to the General Mgr. of the Oakland Calif. plant of the company.

Oliver United Filters Appoints Engineering Field Representative

Oliver United Filters, Inc.
2900 Glascock St.
Oakland 1, California

Gordon M. Girdwood has been transferred from the Central Division of Sales in Chicago to Oakland general offices to fill the newly created position of Engineering Field Representative. He will act as liaison between Engineering and Sales to render maximum service to the customer.

P. A. Hoyt, Ex-Vice President says Mr. Girdwood is well qualified for this important post having broad company experience in engineering, estimating, sales and service, dating back to the early twenties.



**How to Make
STANDARD
VOLUMETRIC
SOLUTIONS
in a Few Minutes**

... Just Dilute Acculate

Acculate is a concentrate. By the simple process of transferring Acculate to a volumetric flask and diluting, a standard volumetric solution can be quickly prepared.

Acculate solutions are contained in sealed ampoules and come to you in clear or amber chemically resistant glass, or wax depending upon the properties of the solution. Acculate solutions of lower normalities are sealed in 50 ml ampoules and those of higher normalities are sealed in 100 ml and 150 ml ampoules. Acculate solutions of all normalities in these sealed containers hold exact quantities of reagents in concentration so that when contents are diluted to 1000 ml with distilled water, the stated normality results.

Acculate solutions in sealed ampoules are convenient to store and remain stable indefinitely . . . and the standard volu-

metric solutions prepared with them are dependable.

Complete instructions for preparing Acculate and a formed glass rod for opening are supplied with each ampoule. Advice concerning end points, titrations and scientific references are supplied with each unit.

Necks of all glass ampoules are pre-scratched so that an ampoule can be easily split into two parts by merely heating the glass rod supplied with it, and applying the heated rod to the scratch. Wax ampoules (containing alkali solutions carbonate free) are opened by simply passing the heated rod through the head.

E. H. SARGENT & COMPANY, 155-165 E. Superior St., Chicago 11, Ill.
Michigan Division: 1959 East Jefferson, Detroit 7, Michigan

S A R G E N T
SCIENTIFIC LABORATORY SUPPLIES

When writing, we will appreciate your mentioning PUBLIC WORKS

CONSULTING ENGINEERS*(Continued from page 80)***RUSSELL & AXON**

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Joe Williamson, Jr.—F. E. Wenger
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engineers having laboratories for
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Physical testing rendering

Every Form of Chemical Service
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Airports—Drainage
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Muscataine, Ia.

HENRY W. TAYLOR**Consulting Engineer**

Post War Planning

11 Park Place

New York 7, N. Y.

**News about
PEOPLE****Successors to Kinsey Engineering Co.**

J. W. Crenshaw, Engineer, and Albert H. Jost, Architect, announce the organizing of the engineering and architectural partnership of Crenshaw and Jost, as successors to The Kinsey Engineering Company, with offices at 512 Court Street, Pekin, Illinois.

Elbin Now Chief Engineer, Bureau of Bridges for Ohio

Guy H. Elbin, for the past eight and a half years bridge engineer for the Franklin County Engineering Department, has been appointed chief engineer, Bureau of Bridges for the State of Ohio, Department of Highways, to succeed William S. Hindman.

Mr. Elbin is a graduate civil engineer from Ohio Northern University

and Iowa State College. At Ohio Northern he was professor of civil engineering for thirteen years and also served as acting dean of the College of Engineering for two years.

James H. Judge Appointed Neptune Assistant General Sales Manager

His many friends in the water works field will be interested to learn that Mr. James H. Judge, Chicago District Manager of the Neptune Meter Company since 1932, has been promoted to the post of Assistant General Sales Manager. When Mr. Judge assumed his new position on July 1st, he left behind him twenty-two years of sales experience with the Neptune Meter Company. Previous to his appointment as Chicago District Manager, he had as his sales territory Illinois and part of Missouri.

CONVENTIONS

October 29-30 . . . The 30th Annual Meeting of the Missouri Valley Section of the American Water Works Association will be held at the Hotel President, Kansas City, Missouri.

November 4-5-6 . . . The American Public Works Association is holding its 51st Annual Public Works Congress at the Sherman Hotel, Chicago.

November 8-9 . . . The relaxed restrictions covering conventions will permit holding the Twelfth Annual Conference of the Virginia Section A. W. W. A. as tentatively planned at Hotel Roanoke, Roanoke, Va.

NEW CATALOGS

Below are described the latest catalogs received by PUBLIC WORKS. All are available free on request to the manufacturers whose names are given.

A New "Monohearth" Bulletin Available

A new bulletin on the Nichols "Monohearth," a system of mechanically stoked incineration, has just been issued by Nichols Engineering & Research Corp. of 60 Wall Tower, New York 5, New York.

The bulletin describes distinctive features of a newly completed 100-ton installation of "Monohearth" at Tonawanda, N. Y. Copies of this bulletin will be forwarded on request.

200-Foot Span Timber Arch Bridge

C. J. Hogue
Chief Engineer

West Coast Lumbermen's Association

A booklet illustrating a 200-foot span timber arch bridge has been published by the West Coast Lumbermen's Association. Among the distinctive features of the bridge design are: Arch chord with metal splices for the weight of the arch only, with spaces between members filled with concrete after erection to make a continuous compression member

**HYDRANTS****and
VALVES**

Expert workmanship and highest quality materials make M & H products a good investment always. Many years of use in all sections of the country has proved their ruggedness and dependability.



M & H furnishes both regular type A.W.W.A. fire hydrants and special Traffic Model (shown at left) designed to yield at the ground line under impact.

**M & H
PRODUCTS**

Fire Hydrants
Gate Valves
Tapping Valves
Special Castings
Tapping Sleeves
Check Valves
Floor Stands
Extension Stems
Mud Valves
Flap Valves
Sludge Shoes

Write for Catalog No. 34

**M & H VALVE
AND FITTINGS COMPANY**

ANNISTON, ALABAMA



GREENLEE PIPE PUSHER



**SAVES \$30 A DAY
ON "UNDER ROAD"
PIPING JOBS ...**

"With our GREENLEE Hydraulic Pipe Pusher we push 3½" pipe under highways in short order. Our 3-man crew does the job easily, where with old trenching methods it would take eight or ten men considerably more time to do the work," says William Hansen, Superintendent for the Diamond Engineering Co. of Grand Island, Nebraska.

"That means about \$30.00 daily labor saving when working such jobs and there's no torn up road, no blocked traffic."

Whether you install pipe under streets, railroads, lawns, sidewalk or flooring, you, too, will find that a GREENLEE Pusher can speed your work and pay for itself on the first few jobs.

Eliminate costly tearing-up, tunneling, back-filling, tamping. Do it the easy, fast GREENLEE way! Write for free booklet S-117 for all facts on the portable, easily operated, easily set up GREENLEE Pusher. Greenlee Tool Co., Division of Greenlee Bros. & Co., 2050 Columbia Avenue, Rockford, Illinois.



When writing, we will appreciate your mentioning PUBLIC WORKS

for the superimposed load; Mesnager concrete hinges applied to a timber arch; a simple crown hinge; glued laminated floor beams to eliminate shrinkage—glues for exterior use have recently been accredited; composite wood-concrete deck serving also as a horizontal beam transmitting lateral loads to end pylons; reinforced concrete sidewalk cantilevered from the composite wood-concrete deck; dog-leg cantilevered reinforced concrete post to take lateral thrust from wood rail transmitting thrust to post; lighting placed below rail to light sidewalk and deck.

For free copy of this booklet write West Coast Lumbermen's Association, 364 Stuart Building, Seattle 1, Washington.

Economical Adaptation of Steel Forms Explained in Bulletin

Practical suggestions for the economical adaptation of steel forms are contained in a new bulletin published by the Blaw-Knox Company of Pittsburgh. These are frank discussions of when and where steel forms should be used and when they should not be used. The bulletin is conveniently arranged for filing and quick reference.

The bulletin goes into detail concerning the assurance of close tolerances in completed concrete construction, the advantages of obtaining smooth concrete surfaces, the ease of collapsing and stripping, the element of safety and the reduction of fire hazards, ease of inspection, the elimination of intermediate construction joints and wire ties, and the simplicity with which the concrete can be vibrated when steel forms are used.

Copies of Bulletin No. 2035, as it is called, may be obtained by writing to the Blaw-Knox Company, Blawnox, Pa.

Asphalt Institute Publishes Manual On Hot-Mix Asphaltic Concrete

Extremely valuable, and very conveniently put together for ready reference, is the 109 pp. Manual on Hot-Mix Asphaltic Concrete Paving. In this small volume the Asphalt Institute presents, for the first time, a complete text devoted to the design and testing of the mixtures suitable for "heavy duty, unlimited traffic on all primary and interregional highways."

Two specifications for asphaltic concrete are given: 1. "Dense graded aggregate type," which will show from two to five per cent voids, and 2. "Graded aggregate type," which should result in a mix having from five to ten per cent voids. Given in detail are the methods recommended for determining the per cent of voids as well as the stability.

A section of the book covers the selection of a job-mix formula, with criteria for a satisfactory stability and what to do when the stability is too low or too high.

Copies can be obtained gratis by writing to the Asphalt Institute, 801 Second Ave., New York 17, N. Y.

